



This is a digital copy of a book that was preserved for generations on library shelves before it was carefully scanned by Google as part of a project to make the world's books discoverable online.

It has survived long enough for the copyright to expire and the book to enter the public domain. A public domain book is one that was never subject to copyright or whose legal copyright term has expired. Whether a book is in the public domain may vary country to country. Public domain books are our gateways to the past, representing a wealth of history, culture and knowledge that's often difficult to discover.

Marks, notations and other marginalia present in the original volume will appear in this file - a reminder of this book's long journey from the publisher to a library and finally to you.

Usage guidelines

Google is proud to partner with libraries to digitize public domain materials and make them widely accessible. Public domain books belong to the public and we are merely their custodians. Nevertheless, this work is expensive, so in order to keep providing this resource, we have taken steps to prevent abuse by commercial parties, including placing technical restrictions on automated querying.

We also ask that you:

- + *Make non-commercial use of the files* We designed Google Book Search for use by individuals, and we request that you use these files for personal, non-commercial purposes.
- + *Refrain from automated querying* Do not send automated queries of any sort to Google's system: If you are conducting research on machine translation, optical character recognition or other areas where access to a large amount of text is helpful, please contact us. We encourage the use of public domain materials for these purposes and may be able to help.
- + *Maintain attribution* The Google "watermark" you see on each file is essential for informing people about this project and helping them find additional materials through Google Book Search. Please do not remove it.
- + *Keep it legal* Whatever your use, remember that you are responsible for ensuring that what you are doing is legal. Do not assume that just because we believe a book is in the public domain for users in the United States, that the work is also in the public domain for users in other countries. Whether a book is still in copyright varies from country to country, and we can't offer guidance on whether any specific use of any specific book is allowed. Please do not assume that a book's appearance in Google Book Search means it can be used in any manner anywhere in the world. Copyright infringement liability can be quite severe.

About Google Book Search

Google's mission is to organize the world's information and to make it universally accessible and useful. Google Book Search helps readers discover the world's books while helping authors and publishers reach new audiences. You can search through the full text of this book on the web at <http://books.google.com/>

TRANSPORTATION
LIBRARY

HE
2978
.R15

A

756,659

DUPL



Black & White
by
in Compliments of

(Vol. 10.)

E
178
15

Charles J. Rand

THE

Railroads of Peru.



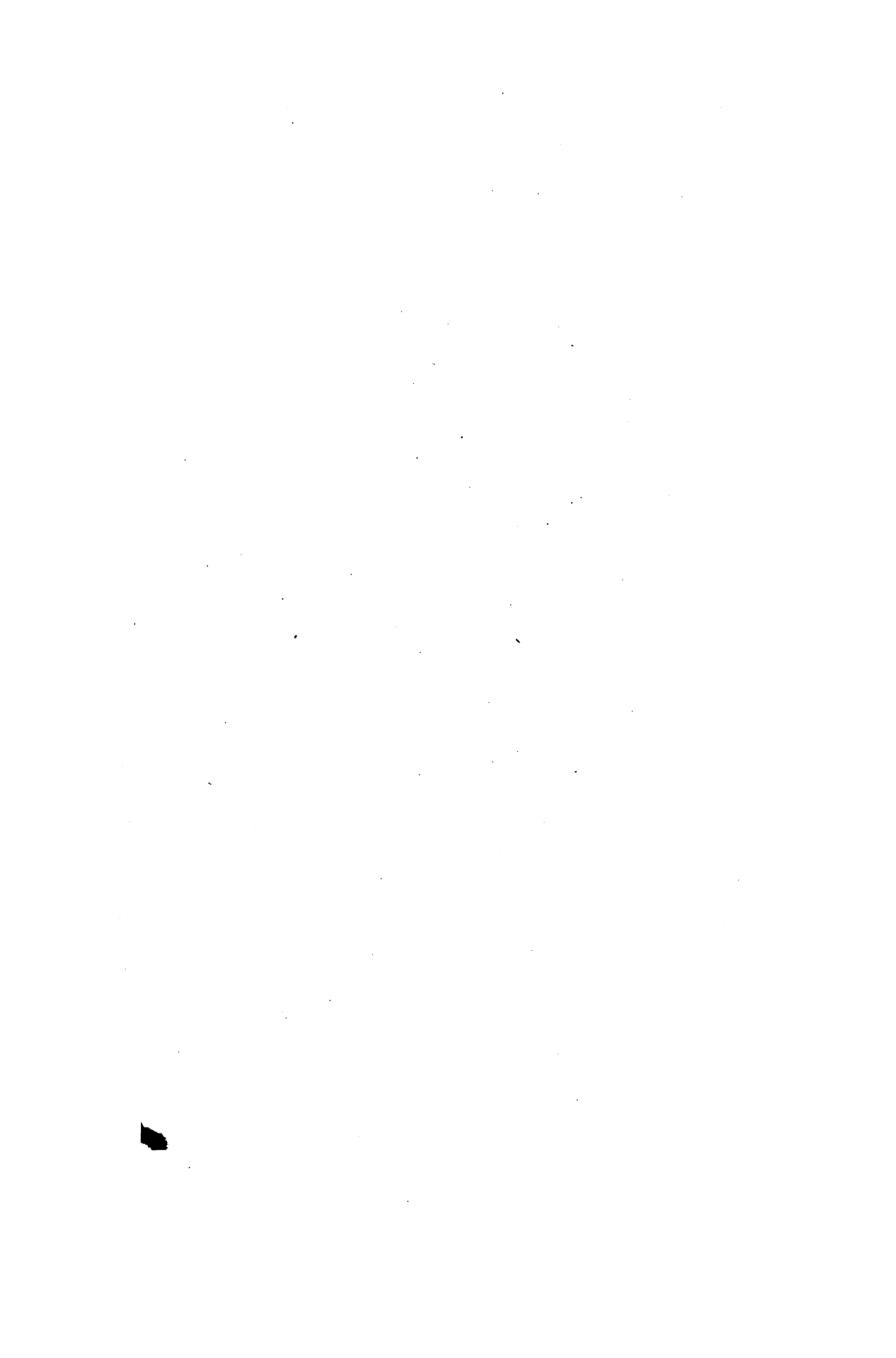
LIMA.

PRINTED AT THE "OPINION NACIONAL", 66, CALLE DE JUNTA

1872.









THE

Railroads of Peru.



LIMA.

PRINTING ESTABLISHMENT, No. 66, CALLE DE JUNIN.

1873.

Transportation
Library

HE
2978
.R15

dy.
71-52

THE RAILROADS OF PERU.

I.

The object of the present work is to rectify the many errors which have been published in the foreign Press, in regard to Peru, her resources, her policy in regard to public works, and especially her Railroads.

It is not our aim to excite or sustain polemics upon the important questions of which we propose to treat: but simply to collect reliable data, in view of which an impartial judgment may be formed as to the extent, importance and utility of the Railroads now built and being built in Peru. With them are closely connected the financial future and material progress of the country, and the world at large has a right to facts. Much has been written upon the subject, here and abroad; but personal bias and political animosities have often given false impressions, and these we labor to correct.

A few general remarks in regard to the climatic, industrial, and commercial conditions of the country will be necessary before entering into statistics. We shall also avail ourselves of the writings of Messrs. Pardo, Paz Soldan, Cisneros, Pezuela, and other eminent writers on public improvements, as well as of official documents from the Archives of the Government.

We expect to show that the Railroads of Peru cost less per mile, than those of many other countries having more favorable conditions for obtaining labor and material; that their building is a wise measure of public policy; that they are urgently needed for the developement of the immense resources of the country, and that since the inauguration of the present Railroad system, yet incomplete, the income of the nation has increased in a gradually augmented ratio, aside from the great indirect advantages bestowed upon the people, which cannot be disputed.

The favorable reception given by the foreign press to data furnished it in regard to the South American Republics, has encouraged us in making this compilation, which we submit to the consi-

deration of the public, confident that, by correctness of detail and logical deduction we shall succeed in neutralizing any unfavorable impression which may have been made by careless, hasty or crude publications on the subject. We would not attribute either bad faith or deliberate evil intention to the authors of such publications; but it must be manifest that the injury to these Republics is the same. As is too generally the case, the sojourn of the writers on these subjects has been so brief that their opinions betray an ignorance of their physical topography, natural productions, and social and industrial condition.

It is, consequently, the duty of all who are in a position to do so, to contribute such facts as may tend to throw light upon this vitally important question, and to dissipate the errors founded upon mistaken or imperfect information.

To bring nations and peoples into contact, to cause them to know and appreciate one another, is to favor the cause of civilization, by promoting their intellectual, commercial and social advancement.

We hope that the impartiality and sincerity of purpose which we bring to this task, may merit the benevolent attention of our readers, and their forbearance for involuntary errors.

Having briefly stated the objects in view, we close this preface and proceed to the consideration of the main questions.

II.

The question of *Government Ownership of Railroads* has formed the subject of heated discussions and various comment, the *price* stipulated in the contracts made with the Government for their construction being the favorite theme of those who have entered the lists of argument.

All are agreed as to the importance, necessity, and advantages of Railroads in Peru; and yet many lose sight of these in discussing the question of cost.

At all events, these being universally admitted, the question is satisfactorily solved in one of its principal phases, and the action of the Government in undertaking the execution of these works, in obedience to the popular will and by virtue of reiterated Congressional sanction, is fully justified.

This is an important point, to which we beg to invite the earnest attention of our readers.

A tendency to exaggeration on the one hand, and a spirit of vituperation on the other—both incompetent to penetrate the natural causes that have influenced the determination of price—instead of

seeking to investigate these causes, by studying the physical difficulties necessary to be overcome by engineering skill at unusual cost, have preferred to discourse upon them capriciously, often without due respect to truth and justice. And, unfortunately, the question has too often descended to the arena of personalities, where it is impossible to sustain a serious, reasonable, and impartial discussion.

To decide correctly so complicated a matter, it is necessary to take into consideration facts and circumstances, which require a close acquaintance with the profession of contractor. And it should also be remembered that neither theory nor practice alone will suffice to solve this problem of cost, since in this matter, more difficult than it appears at first sight, there are no fixed principles.

Combinations and calculations, in order to approach exactness, must be made upon the ground itself, and modified to suit the necessities of the moment. Every experienced contractor knows that nothing is more deceitful and precarious than an estimate. Nor could it be otherwise, since the cost of labor and materials, the basis upon which all estimates rest, are not subject to unvarying rules, but like every other branch of commerce and industry, must submit to the universal law of supply and demand, and follow its fluctuations in the markets of the world.

In this respect, in the words of Mr. Perdonnet, the eminent French engineer. "The unforeseen upsets all human calculations."

The truth of these words is daily felt in railroad construction; so much so that a contract, apparently most desirable in the beginning, may terminate in the ruin of the contractor.

Those who decide *ex-cathedra* in regard to the cost of a railroad, without knowing either the final location, the topographical difficulties to be overcome in its execution, the elements which the contractor may have at his disposal, or the economic conditions of the country in which the work is going on, are liable to fall into errors of judgment, the more unwarranted, since their expressions of opinion are wanting in logical foundation.

Those who have written so superficially upon this important matter, without considering the great harm that may result to the honor and credit of Peru, are unaware, or perhaps forget, how different it is to build a Railroad, in the United States for instance, where everything abounds and is, so to speak, on hand at the hour and on the spot desired, from building one in Peru, where every thing must be brought from abroad, from the *peon* who is to build the bank, to the oil that shall lubricate the wheels of the locomotive.

They ignore the fact that, here, the market price of nearly everything is greater than in other countries. from the wages of the laborer, to the interest of money, which at times, as now, reaches 15 % per annum.

In other countries, where there are great manufacturing centres: where many banks and great commercial activity produce abundant capital at low interest; where labor is plenty; where neither time nor distance are obstacles, since steam and telegraphs have annihilated both; where specialties in all branches of industry are easily obtained; where the press undertakes, day by day, to publish all improvements and new inventions that facilitate, abbreviate, multiply, or substitute the labor of man, by means of instruments or machinery *ad hoc*, the formation of an approximate estimate of cost of ordinary work in normal conditions, is neither so difficult nor so attended with risk.

But this same task, in countries placed in entirely different conditions from those we have indicated, is neither easy nor sure; but on the contrary, should be considered as daring, and attended with great risk. Consequently, one accustomed to estimate and locate Railroads in England, Belgium, the United States, or other similar countries, would fall into countless errors, should he persist in applying the same rules, and the same calculations to Peru.

The following will serve as a means of comparison for those who, without taking due note of the difficulties and drawbacks of the Railroads of Peru, declaim, without ceasing, against their exorbitant cost. In one single line, that from Mejia to Arequipa, one of whose termini is upon the Pacific coast, at a port of entry specially so declared for the vessels consigned to him, the Contractor, in spite of this and of every other facility afforded him always by the government to hasten the conclusion of the road had to spend 440,000 soles (*hard dollars*) for *powder*, and one million in opening temporary roads. These two items, although notable in a line of only 107 miles in length, are nevertheless not so worthy of consideration as the very unusual one of *water*. It is calculated that this article, a necessary of life, cost no less than the enormous sum of S. 500.000; that is to say at the rate of nearly *one thousand soles per day*, during the nineteen months employed in the building of this monumental road, to the construction of which, 12,000 laborers native and foreign, the latter mostly Bolivians and Chilenos, contributed.

PERUVIAN RAILROADS.			
CONTRACTED WITH HENRY MEIGGS.			
NAMES	MILES	IN BONDS	IN CASH
Mejia to Arequipa	107		S. 12,000,000
Juliaca to Cuzco.....	230 212		.. 25,000,000
Chimbote to Huaraz and Recuay	172		.. 24,000,000
Pacasmayo to San Pedro and Guadalupe.....	93	S. 5,000,000	.. 2,100,000
Calasfrique to Magdalena.....			.. 3,750,000
Ilo to Moquegua.....	63	.. 6,700,000	.. 5,025,000
Arequipa to Puno.....	222 217	.. 32,000,000	.. 25,280,000
Callao and Lima to Oroya.....	145	.. 27,600,000	.. 21,804,000
Total.....	1042	S. 71,300,000	S. 118,959,000

1,009
III.

But, let us put aside economic considerations of a general and undefined character, and examine the question on the firm and undeniable ground of facts and figures.

The preceding table shows us that the seven Railroads, the construction of which is in charge of Mr. Meiggs, on account of and at the expense of the Government of Peru, will give a length of 1,042 English miles, at a cost of S. 118,959,000 in cash.

(1) That is to say, that according to the tenor of the contracts, entered into by Mr. Meiggs, each mile of Railroad costs the Government of Peru an average of S.114,000, while in the U.S. it costs 52,000; in India, 78,000; in France, 108,000, in Belgium, 130,000; in Germany, Russia, and Holland, S. 160000, and in England S. 168000.

Moreover, in order not to fall into error through the figures we have given, it were well to bear in mind that, in addition to the value of the lines mentioned, which must be constructed on a par with the best in Europe and North America, and equipped and furnished with materials, engines, tools, and requisite fittings, adequate in number and quality to the conditions and importance of the lines, there are also included in the prices stipulated the cost of the preliminary surveys and plans, that of the right of way and necessary land taken, and that of various accessary works, among which, the following are worthy of special mention :

Four piers or wharves, the dimensions, material and system of which are determined in the several contracts. In order to duly appreciate the importance of these works, it is necessary to know the geographical conditions of the coast of Peru, remarkable for the

(1) To determine the cash equivalent of the total cost of the railroads, contracted with Mr. Meiggs, we have calculated the Oroya bonds and those of Puno at 79 p^o and those of Magdalena and Ilo at 75 p^o in accordance with agreements made with the Government.

unprotected character of its ports or rather open bays, where the terrible surf, breaking high over the beach, augments in an enormous degree the cost and difficulty of these hydraulic works. The piers alluded to are to be built at Ilo, Mollendo, Chimbote and Pacasmayo, the marine termini of the lines to Moquegua, Arequipa, Huaraz and Magdalena.

Four first class telegraph lines with all the necessary offices, apparatus, and appurtenances.

Two lines of water pipe, more than 10,000 metres long, with filtering galleries, constructed as far as regards strength and capacity, in conformity with the conditions of the ground and local requirements.

All the works are built under the immediate supervision of State Engineers, appointed *ad hoc* by the government, and the materials employed have to be inspected by the agents of the government at the place of purchase.

The *price* is paid to the Contractor in monthly instalments, according to the amount of work done, the government not being required to furnish, in any case, an amount exceeding the value of the work executed, and materials purchased; the Contractor being obliged to leave in deposit in the Public Treasury, an amount not less than S.4,500,000, as a guarantee for the faithful fulfilment of his contracts.

This guarantee is to remain in force until *three years* after the conclusion and final delivery of the roads, the Contractor being responsible during this period for the repair, at his own expense, of any damage caused by defective work.

The railroads mentioned have, beside many other accessories, such as repair-shops, freight houses, tanks &c., 102 passenger and freight stations, of which 20 are of 1st class, 36, 2nd class and 46 3rd class; all constructed according to plans approved by the government, and fitted up with all the machinery, apparatus, and other requisites, according to the importance of the lines, and the necessities of the freight and passenger traffic.

It will be necessary, in order to construct these lines, to remove, according to the calculations of competent engineers, more than 40,000,000 cubic metres of earth, clay and gravel, and more than 9,000,000 cubic metres of hard rock.

Besides this colossal task of cuts, excavations, and embankments, there is also the equally important one of fencing, quarrying, retention walls and defenses against floods and mud-torrents—

and, moreover, all those auxiliary works of timber, masonry and iron work demanded upon roads requiring a multitude of tunnels and bridges.

The works we have just indicated would hardly offer difficulties, it is true, to an experienced contractor, were it not that enterprises like the railroad system of Peru, are in entirely anomalous conditions, especially those known as Trans-Andean.

The data hereinbefore given would not be sufficient to form any estimate of the importance and difficulties of the railroads now being built in Peru.

It is necessary to bear in mind, above all, that the Cordillera of the Andes is one of the most abrupt and elevated on the globe. So that to go from one terminus to another, obstacles of all kinds have to be overcome—gullies, rivers, hills, and precipices must be conquered by means of tunnels, bridges and viaducts. On the lines constructed, and now building by Mr. Meiggs alone, it will be necessary to erect 200 bridges of all forms and dimensions, from 20 up to 1600 feet in length, and to make 70 tunnels from 100 to 4000 feet in length, the whole length of which will be 24,000 feet of 19 feet in height by 16 in width.

These lines are in reality, as shown in that of the Oroya, belts of iron, which starting from the shores of the Pacific, proceed by a series of developments and astounding zig-zags to overcome the rocky crests of the Andes, by means of side cuttings and V's., requiring the adoption of daring curves of 120 metres radius, grades of 3 and 4 per cent, immense cuts, viaducts, and tunnels, and of all the resources of audacity and talent, in order to overcome the indescribable obstacles which seem to block the path in every direction. Prominent in beauty and merit among these gigantic works, whose magnitude contributes to the grandeur of the panorama presented everywhere to the contemplation of the traveller, is the chain of tunnels and bridges which the locomotive must traverse before reaching the terminus of *La Oroya*, a small village giving its name to the road, 136 miles from Callao and 12,178 feet above the level of the sea.

Especial mention is due, among these works, as bold and formidable, the *summit* or *Galera* tunnel, 4000 feet long, bored in solid rock, at a height of 15,645 feet above the level of the sea: the *Infernillo* pass between two tunnels with a bridge of great length, and at the height of 11,560 feet; and the famous viaducts of Agua

de Verrugas and Challapa, the first, 576 and the second, 380 feet long—252 and 150 feet high respectively, at 5,840 and 7,950 feet above the sea level.

The other roads likewise offer, in their winding way between hills and through gorges, works almost as important and notable as those mentioned in referring to the Oroya : and eloquent witnesses to this fact may be found in the wonderful cuttings on the Arequipa and Puno roads, the bridges and tunnels on those of Cuzco and Chimbote, besides many other works in water, earth, and rock which we do not describe in detail, in order not to extend the limits of this pamphlet.

This has been, at least, partially done in the reports presented to the government by the engineers who made the preliminary studies of the lines in construction, and by the Special Commissions named for the inspection and delivery of those already finished.

These labors are inevitable and, as has been shown, are more difficult and costly than in many other countries of America and Europe. Without them, and without the aid of all the expedients offered by engineering science, the trans-andean lines could never have succeeded in climbing the steep passes of our wild Cordillera— Suffice it to say that, leaving Arequipa, which is 7,642 feet above the level of the sea, the engine has to mount to an altitude of more than ~~14,000~~ feet, in order to be able to enter, after conquering almost indescribable obstacles, the city of *Puno*, situated on the borders of Lake Titicaca at ~~10,002~~ feet above the level of the sea ; and descend from *Juliaca* which is at ~~12,046~~ feet, to *Cuzco*, the famous capital of the Inca empire, on the banks of the Huantanay, at 11,375 feet of elevation. The same difficulties are presented in the Chimbote line, where in order to arrive at the termini (*Huaraz* 9,920 feet and *Recuay* 11,040 ft.) it is necessary to construct a large number of tunnels and bridges, among which the most notable are the viaduct of the *Huaylas* and *Caraz*, the former 550 feet long and 9,140 feet above the level of the sea, and the latter 370 feet long at an altitude of 7,337 feet.

66
88.
a sum
7.200

12.

To all this must be added a circumstance the more worthy of consideration if it be remembered that until the present time, it has never formed an element in the calculations of any Railroad in the World. This is that the most difficult and important works on the lines mentioned, are in the heart of the Cordillera and in the region known in Peru by the name of Puna, that is to say, at elevations of five, ten and fifteen thousand feet above the level of the sea. In such spots it is necessary to struggle not only against the scarcity

of every necessity of life, but at the same time against topographical difficulties, and dangers, and against climatic and atmospheric influences, storms, lightning, hail, rain, snow, and ice, rolling boulders, freshets of mud and the *soroche* (illness caused by the rarity of the atmosphere.) All these, and other influences essentially economic, affect to such a degree the labor supply, that it is only by great sacrifices and at heavy expense that hands can be obtained: and even then, at certain seasons of the year, for six or eight hours labor per day, it is necessary to pay two soles per day and food, without counting cost of transportation, medical attendance and many other expenses which, although not here stated, weigh no less heavily upon the estimates of the contractor. (2)

IV.

The Legislation of Peru in regard, to Railways, is quite defective and inadequate.

It is made up of a number of laws, decrees, and resolutions which, without order or connection, have been emitted from time to time, from 1825 to date.

The most notable want, and one which should most promptly be met, is that of an organic law establishing bases and fixed rules for the construction, administration, service, and police of the bridges, roads, and Railroads of the Republic.

In the long and curious collection published anonymously in 1871 in three volumes, the most important in their general character are the laws of 1864, 1868, 1871, and that of 1873, which we insert later on.

The law of November 8th, 1864, contains, among other less important provisions, the three following articles:

Art. 1st. The Executive is authorized to take measures to contract for the construction of a Railroad between the port of *Pucasmayo*, and the city of *Cajamarca*, with such branch lines as may be deemed requisite, either for account of the Government or for account of private parties, the following conditions being observed in the latter case.

Art. 2nd. The Executive is authorized to guarantee to the Con-

(2) The Pacific Railroad, longer but not more difficult than the Oroya, reaches its highest point at Evans' pass, situated in the Black Mountains which stretch for 80 leagues between Point Laramie on the North and Pikes Peak on the South. Therefore, while on the great Pacific line, in a length of 240 miles only 8,242 feet of altitude (the height of Evans' Pass) greater than that of Mont Cenis have to be overcome, in the Oroya within a length of only 78 miles, it is necessary to rise to the prodigious height of 15,645 feet above the sea level!

From this and from what has been stated in regard to the Cuzco, Puno, and Huaraz roads, it will be seen that the Trans-Andean Railroads of Peru are the highest in the world.

tractor or Company formed to build the road a minimum interest not exceeding seven per cent *per annum*, and during twenty five years at farthest, upon the capital deemed indispensable for its construction, to be paid out of the National Treasury.

Art. 3rd. The Executive is authorized to apply the conditions contained in this law to the Railroad which is to run between the city of *Huaraz*, and the port of *Santa*, and to *all the others which may be established in the Republic*, so soon as their utility and practicability are satisfactorily proven, encouraging the formation of companies to carry them into effect.

On the 15th of January, 1868, the President signed a general law upon the building of Railroads and issue of bonds, the principal provisions of which, are comprehended in the two following clauses:

Art. 1st. The Executive is authorized to take measures, in accordance with the law of November 8th, 1864, and after the necessary studies and estimates have been made, to contract for the building of the Railroads from *Arequipa* to *Puno* and *Cuzco*, from *Chimbote* or *Santa* to *Huaraz*, from *Trujillo* to *Pucasmayo* and *Cajamarca* from *Lima* to *Jauja* and of such others as the country may require.

Art. 2nd. He is also authorized, should he deem proper, to issue bonds, the service of which shall be performed by the Government, bearing interest at six per cent and with an accumulative sinking fund of two per cent; said bonds to be received at par by the contractors, who shall agree that the amortization shall begin ten years after the issue.

And, finally, under date of January 24th, 1874, a railroad law was promulgated as follows:

Art. 1st. The Executive is authorized to proceed at once to contract for the construction of the following railroads: *Cuzco*, *Cajamarca* and *Ancachs*, either by private enterprise or combined enterprise or by the issue of bonds which from their date shall gain 5 per cent interest, with an accumulative sinking fund of 2 per cent, the redemption to begin in 1880: the nominal value of the issue not to exceed, in any case, fifteen million pounds sterling.

Art. 2nd. The bonds issued by virtue of this law shall be employed for the payment of the railroads mentioned, which may be built *for account of the Government*, and of that from *Ilo* to *Moquegua*, or in purchase of the shares it may take in the combined enterprises.

Art. 3rd. These provisions are made to extend to the *Piura* Rail-

road, and that from *Trujillo* to *Huamachuco* so soon as the preliminary surveys are finished, as also to the prolongation of the *Oroya* road to the city of *Ayacucho*.

Art. 4th. The law of January 18, 1867, as well as Art. 3rd of November 8th, 1865. in so far as it refers to the guarantee of 7 per cent as a *minimum* of interest, are repealed.

Art. 5th. Two millions of pounds sterling of the fifteen issued, shall be devoted to the irrigation of the lands adjacent to the coast at such points as may be deemed practicable; beginning with those places where the preliminary studies have been already made. (8)

To General Pedro Diez Canseco belongs the credit of having initiated the great era of railroads by signing the contract of that from Mejia to Arequipa, in 1868.

His successor, the unfortunate Colonel Balta, to whom posterity, less impassioned than his contemporaries, will assign that distinguished position among the rulers of his country to which he is justly entitled, far from abandoning the path traced out by his predecessor, followed in good faith the progressive movement of his epoch.

The present President, Don Manuel Pardo, has manifested equal interest in the completion of the great railroad system of Peru, and more than ten years ago ably advocated with his pen its elevating and refining influences. It will form no part of our task to criticise the political acts of those who have occupied the Presidential chair in Peru. Such criticism would be uncalled for, as well at foreign to the aims of this publication. Our object is to present facts rather than to emit opinions.

In view of the imperative necessity for promoting the advancement of the country, the Government has omitted no effort to encourage the building of Railroads in every Department of the Republic. All the resources permitted by law have been employed as circumstances required.

The question arises which system of constructing lines is the

(3) By virtue of the said authorizations the respective contracts have been made with Mr. Meiggs, and for the payment thereof the loans of 1870 and 1872 have been offered in London; the latter for the sum of £36,800,000 with the object of also consolidating the foreign debt of the Republic.

The scrupulous exactness with which Peru has always attended to the service of her loans, the solid and positive guarantees she offers to the holders of her bonds, and the growing development of her commerce, agriculture, and manufactures are powerful motives to inspire confidence in the success of the financial operations relating to the said loan of 1872, now being carried out in Europe.

most economical and advantageous to the interests of the country in general; by private enterprise, by mixed associations, or for absolute Government account.

It is not easy to solve a question so complex and so often discussed as this, since this, as well as cost, depends upon the special conditions of time and place to which they refer. Even to-day opinions in this respect are not unanimous among scientific men. We believe that the Government of Peru has decided wisely in adopting the latter system.

Fully authorized by Congress, it has chosen, according to its convictions of right, the most practicable and easily realizable means of carrying out the aspirations of the people, placing within their reach and at their disposal this powerful element of civilization which has built up the greatness of England and the United States and to which, later, the Argentine Republic will owe her own.

In another portion of this essay, we have endeavored to show by facts and data of incontrovertible character, that the *cost* of the railroads being constructed for exclusive account of the Government is far from being exorbitant, as those who have written upon the subject, without examining and studying it in all its phases, continue to insist.

It has been said, nevertheless, within and without the Republic that it would have been more advantageous for the Government had the said railroads been constructed by private enterprise.

No one denies it. So it would have been, could contractors be found who would agree to build and run certain lines without claiming guarantees, privileges, exemptions, and franchises such as the Executive may concede and has conceded by virtue of laws of the Republic.

That is to say, the Government instead of risking a *probable* loss would have weighted itself with a positive burden.

And this we say, because the arguments of those who oppose the system of contracts for account of the Government, are based upon the supposition that the great Railroads, the Trans-Andean, will not pay even thirty years hence their working expenses.

Allowing for the sake of argument the capricious and inadmissible supposition of these pessimists, it would appear that the Government would have proceeded with more prudence and wisdom, paying to a company 7 per cent per annum during 25 years, without other prospect than that of owning the road at the end of 75 or 99 years, than by constructing it for its own account and paying its value in Government Bonds, for the service of which, in interest

and redemption, the time and money expended by the Government in attending punctually to the payment of the said guarantee, would have more than sufficed. (4)

The Government of Peru would have accepted heretofore, as it doubtless will later, any proposal from a private Company, whenever it may appear more advantageous to the interests of the na-

(4) "We are all satisfied of the utility of railroads: so that we have merely made a few notes to manifest their relative importance to our country, and to those in analogous conditions: but the practical question is to ascertain the best means to construct them rapidly, and upon this, we wish to express the opinion we have formed, studying with attentive interest the various methods employed in the United States and in Europe.

Two opinions, unfortunately very general among influential men, have served as obstacles to this class of public improvements.

"First," say they, let the population augment and let it make the necessary improvements." Lamentable error! since without easy communication the growth of population becomes impossible. Experience, the best teacher in questions of this kind, proves it, since the United States following the opposite system, building railroads across unsettled lands, have succeeded in obtaining the most rapid and permanent immigration known in History.

The other opinion, no less erroneous and hurtful, is that which supposes that those who form a company must of necessity make enormous profits. Consequently, instead of offering them protection, they have been haggled with and obstructed, consequently no company of importance has been able to prosper, and in Mexico, all business has fallen into discredit. From experience so unfortunate we should take heed and follow the opposite path; granting privileges, liberty, and decided protection to the first who are daring enough to introduce new enterprises: no meanness; let them gain and gain largely, so that selling their shares at high premiums, national credit may be raised. It will thus invite new capital to enrich our virgin soil.

The systems adopted by different nations in the execution of public works are essentially different; but when built by companies, they are generally efficiently protected.

In England and in the United States, railroads are generally considered the exclusive property of the companies, which are left in complete liberty, the Government only intervening in their police and security.

In France, Belgium, and the greater portion of the German States, it is held as a principle that railroads should be Government property: consequently they are either constructed with public funds and by engineers of the State, or they are ceded to the companies constructing them, for a fixed period, after which they become Government property. This period is calculated as sufficient to reimburse the shareholders the amount of capital invested with interest.

In this class of concessions, the Government intervenes directly in the construction and management, but compensates the companies, assuring to them a profit proportioned to the capital they invest, executing for their own account the tunnels, viaducts, and other works, which it cedes to the companies, and giving them large subsidies.

The most interesting question of all connected with railroads is that of tariff, since if it be not moderate they lose the greatest of their advantages. Experience is proving by a thousand examples, that as prices lower, profits augment. Nevertheless as avarice blinds reason, many companies persist in retaining high rates, for which Governments have thought proper to intervene in their management, and in order to have the right to do so, give them subsidies, or guarantee them an interest upon their capital.

In England, the companies taking advantage of the freedom they enjoy, have not only retained higher tariffs than on the Continent, but combining together have lately raised them; so that the public is already murmuring, and the opinion becoming general that the Government should furnish a remedy; the first step in this direction having been taken with the telegraphs, which the Post-Office Department has bought from the private companies.

A wise and patriotic Government, considering itself as the administrator of the interests of its people, should promote everything which tends to the prosperity of its citizens, since it is the sum of private fortunes which makes the wealth of nations: and meagre will be the income of that nation, the majority of whose citizens are in misery; oppress and extort as it may. Resting on these sound principles, governments do not hesitate to assist enterprises of public utility, with

V.

From the time when, in 1830 (7) the expediency of railroads was made patent by the results of the line built between Manchester and Liverpool, wise and far-seeing Governments have considered railroads of urgent and unavoidable necessity; and the progress which has been made in this respect, within less than half a century, is the most striking proof of their vitality and of their beneficent influence upon the moral, material and intellectual advancement of the world.

At the present date there are more than 140,000 miles of railroad in the world and nevertheless new lines are being constructed everywhere with untiring zeal:—the State intervening wheresoever individual enterprise is insufficient, as the United States have done with the Pacific Railroad; France and Italy with that of Mont-Cenis; England with that of the Euphrates; Russia with that of Siberia Germany with that of San Gothard; and following the example of the countries we have mentioned, Spain, Belgium, Switzerland, Holland, Brazil, Chile, the Argentine Confederation, Columbia, Bolivia, Costa Rica, Mexico, Salvador, Hon-

Representatives; *Felix Manzanares*, Senator, Secretary; *José Maria Gonzales* Deputy, Secretary.

Therefore, I order it to be printed, published, circulated and duly observed.
Given in the Government House in Lima, this thirtieth day of April 1873.

MANUEL PARDO.

FRANCISCO ROSAS.

(7) Four years before, on the 13th of May, 1826, Messrs. John Begg and Francisco Quiroz had already endeavored to build a railroad between Lima and Callao.

The Government granted the requisite permission to Messrs. Quiroz, Cochrane, and Fletcher, who were unable to carry out the project; and this is not surprising, when we consider what was passing, at that time and for many years afterwards, in the country of Watt and Stephenson.

This same railroad, begun in 1848 by Messrs. Candamo and Oyague and Brother was the first one constructed in South America.

To these we may add other curious and interesting data in the history of steam, as the name of Peru figures therein.

TREVETHICK (who passed many years of his life in *Cerro de Pasco*) and Vivian, his colleague, placed, in the year 1803, on the Cornwall railroad a steam engine which they could not manage. They believed that "between two plane surfaces, the adhesion (traction) must be weak, the cars are liable to slip and the motive force is lost."

MR. UVILLE a Swiss, resident in *Lima*, bought in England and shipped in September 1814, three steam engines on the Trevethick model, one of which was set up in the Santa Rosa mine, situated in Laricocha.

The first steamer which arrived on the coast of Peru was the *FELICA*, owned and commanded by Captain Metrovich, having made the voyage under sail, from Europe to Guayaquil, and there received her engine, Columbian flag, and passengers.

After an excursion in the Guayaquil river the Sunday before his departure, he put to sea, bound for Callao Progressing but slowly however on account of the fogs he got short of fuel, and being exasperated by the complaints of his passengers, one day while they were breakfasting in the port of Huarmey, fired his pistol into a barrel of powder, and blew up the steamer. All the passengers and crew were killed. The hull of the steamer still lies in Huarmey.

duras, Guatemala and even Japan, have each done likewise; seeking in this noble strife of Peace and Labor the palm of victory. (8)

The following are the words of the Emperor of Brazil in his last message to the General Assembly, upon this most important question:

“The economic interests of Brazil, which daily increase in importance, demand, above all, for their greater and more rapid development, the acquisition of useful labor, professional teachings, roads and telegraph lines. In the combined application of these blessings will be doubtless found the future security of our principal industrial enterprises, so that the transformations which, with the lapse of time, must occur in questions of labor and land, may be effected without damage.”

No less remarkable and eloquent are those of the President of Chile, in his message at the opening of Congress when, alluding to the Railroads in operation and in construction, he says, in reference to those of San Rosendo, Los Angeles and Angol:

“The country is justified in anticipating great benefits from this most important work, which is destined so powerfully to influence, not only the prosperity of commerce, agriculture, and manufactures but, what is more important still, the security and complete pacification of the frontier.

“The locomotive is shortly to solve the problem of three centuries duration, showing practically to the barbarians dwelling upon those broad rivers and immense plains, the power as well as the advantages of civilization.”

And, more than ten years ago, Don Manuel Pardo, the present President of Peru, in his brilliant “Studies of the Province of Jauja” wrote:

“Say then, whether a revolution will not be brought about in Peru, a revolution at once physical and moral; for the locomotive

This occurred 42 years ago (1831) that is to say, before steam navigation between Europe and America had been established.

The Pacific Steam Navigation Company was established in 1840, with the steamers Chile and Peru; the latter, under command of Captain Peacock, entered the port of Callao for the first time on the 3rd of November of that year.

(See “*History of the Arequipa Rail road with documents.*”)

(8) The “National Pacific Railroad company” for the construction of the line from Omaha to San Francisco, the length of which is 1,727 miles, obtained from the Government of the United States the following franchises and privileges.

1st. A free grant of 16,000,000 acres of ground, along the line of the road, valued at \$40,000,000.

2nd. A loan of \$52,976,000 in National bonds payable in 36 years with 6 per cent interest per annum, payable by the Treasury Department.

3rd. The right to issue mortgage bonds with six per cent annual interest up to a sum equal to that of the loan, said obligations to be redeemable in thirty years and having preference, for their payment, over Government Bonds.

So that the company undertook this colossal enterprise, counting upon cash

which transforms, as though by enchantment, the aspect of the country through which it passes, civilizes also ; and this is perhaps its greatest advantage, it not only civilizes, it educates the people it brings in contact. All the primary schools of Peru would not teach our native population in a century what the locomotive would teach in ten years."

And as most appropriate, let us close these quotations, with some reflections of the eminent Mexican engineer Señor Robles Pezuela, which we extract from his work "*Notes upon material improvements as applicable to Spanish America.*"

"The sacrifices which we make for this purpose will be amply compensated by the accommodation of the people, protection to productive industry, and increase of public wealth.

"Upon studying attentively the present condition of Europe, it would seem surprising that among so many nations with different systems of Government and different interests, the peace and equilibrium resulting from prosperity, should be preserved. He who, judging hastily, should attribute these blessings to the wisdom of Governments would fall into error. They contribute to some extent, but there are various concurrent causes—the principal and most efficacious being, doubtless, the great development of rail-

assistance, outside of their own capital and resources, to the equivalent sum of \$145,952,000, or at the rate of \$84,000 per mile of road.

Similar concessions were also made to the Sacramento and San Francisco road, 124 miles in length. From the data before us, it appears that the railroad from Omaha to San Francisco embraces an extent of 1,851 miles, and that the Company has received from the Government, for its construction, in lands and Government bonds, a sum equivalent to \$96,252,000, exclusive of the amount of mortgage bonds issued according to law, amounting to a grand total of \$152,504,000.

In addition to the moral and material aid received from the Government of the United States, the company has also received that of some of the individual States, through which the line passes.

The interoceanic railroad was looked upon in the United States as a great politico-economic necessity; and, considering its magnitude, both people and government understood how indispensable was its realization, and for that purpose agreed to stimulate the spirit of enterprise by means of extraordinary grants. The law was passed and signed by President Lincoln on the 1st of July 1862, that is, during the fiercest of the struggle for the preservation of the Union.

The policy of Chile in railroad matters, is the same adopted by the Government of Peru, that is, to construct them for Government account.

Had the Government of Chile not proceeded thus, the lines which have made that Republic one of the most flourishing and of highest credit in the world, would perhaps not yet have been constructed.

The railroad between Santiago and Valparaiso, justly considered one of the most important of South America, and in which the works most worthy of admiration as daring and grand, are the Maquis viaduct, the tunnels of San Pedro and the Tabon, and the famous Montenegro cut, where it passes its highest altitude at 2,470 feet above the level of the sea, still cannot compare with the trans-andean lines of Peru.

And nevertheless this railroad, only 114 miles long, cost the Government of Chile in original outlay, more than 12,000,000 of soles, and to-day, if our memory serves us, we believe that, with repairs, improvements and additions, there have been already expended upon it for account of the Government more than 16,000,000. The wise foresight of the Government of Chile has produced brilliant

roads, which rendering both communication and transport extremely rapid, and allowing the rapid concentration of the disposable forces of each nation, make long and disastrous wars impossible.

"When railroads, which have been so beneficial to Europe, first began to be constructed, there already existed a dense population, good roads and canals, and in the United States, grand navigable rivers, affording easy communication. In our countries, wanting in such facilities, the advantages of railroads will be relatively much greater.

"The needs of Mexico, and in fact of all Spanish America, are peace, increase of population, equilibrium of the public income and expenditure, and the export of the products of the soil. All these will be attained when we have a net work of railroads uniting our producing districts with the coast.

"In writing these lines, would that we were gifted with eloquence, in order to inspire our fellow countrymen with our intimate conviction that this is the true path of progress, easily reached by perseverance and decision.

"A good and liberal public administration; simple, efficient, and prompt justice, and a wise system of education are necessary for a nation's well-being: but elements apparently so heterogeneous are in practice intimately interwoven with material progress, and nothing contributes more efficaciously to the attainment of these blessings than the easy and frequent contact afforded by Railroads.

"The influence of material upon intellectual advancement is

results through this road! The Treasury has spent some millions; but the people have received back their value with interest in moral, material and intellectual advancement.

We are all aware of the heavy sums employed and the liberal grants given by the Argentine Republic, in favor of railroad enterprises; and we likewise know the splendid harvest she is reaping from this well understood economy, in foreign immigration and augmented production.

France and Italy have spent more than \$16,000,000 in the opening of the Mont Cenis tunnel which is only 12,200 metres long, at a height above the sea very inferior to those of the Oroya and Huaraz.

France expends, moreover, many millions in subsidies to railroad companies.

According to the French law, the Government builds the sub-structure, which is the most costly, and the companies furnish the superstructure, the rolling stocks and equipment. The value of the latter is returned to the companies, when, at the conclusion of the concession they return the road to the Government.

The subsidy in France is an average of \$14,000 per kilometer, guaranteeing moreover the interest upon the social capital.

Russia, Holland, Germany, Italy, Brazil, and many other nations of the civilized world follow the same system; that is to say, that of building for government account, where concessions and privileges do not succeed in overcoming the inertia of the spirit of enterprise.

And these heavy outlays, yearly increasing everywhere, are not looked upon as prodigality or waste of the public funds, since experience has demonstrated that railroads indemnify with usury the sacrifices made by the people for their encouragement and protection.

greater than appears at the first glance ; thus, for example, the discovery of glass has been one of the principal elements in the enlightenment and progress of the world. At first it gave light and shelter to dwellings where man could devote himself to study and meditation : later, converted into lenses, it formed the telescope, without which astronomy would be but guess-work ; nor could chemistry, with its thousand applications have made any progress of moment without glass vessels and apparatus : electricity, so fruitful in marvels was discovered by the friction of a glass globe, and the steam engine, that agent so mighty, yet so submissive to the hand of man, multiplying his energies and applying them to the service of humanity in countless forms of industry, would never have been invented, had not the Torricellian tube, the thermometer, and barometer furnished the means of studying the laws of caloric, and of the elasticity of gases.

“ The enlightening influences of railroads are powerful. We owe it to them that local prejudices and those of race are disappearing ; to them, that diffusion of progressive ideas that will distinguish the Nineteenth Century in History ; to them the suppression throughout nearly all Europe of the passport system, and the simplification of Custom House regulations ; two annoying hindrances to liberty of action and of travel.

“ None can doubt that railroads in Mexico will prove an efficient element in the preservation of peace ; since her disturbed condition results from the difficulties which great distances and roughness of the ground offer to the putting down of armed bands, often assembled without any fixed political plan. The history of all nations offers examples analogous to what now occurs in Spanish America, It is a general principle—mountains and bad roads, bandits and revolutionists.

The immediate consequences of assured peace are the diminishing of the army and of the expense of maintaining it ; and since at the same time the public income is increased, not only an equilibrium but a surplus will accrue.

“ No country has made colonization laws as liberal and protective as Mexico, yet she has not obtained through them the desired result ; for the want of good roads is an insufferable obstacle to the prosperity of a colony. It may be asserted, therefore, that where such do not exist, it will be impossible to attract immigration, which will however, immediately flow in so soon as railroads offer facilities for gaining a livelihood.

“While the colony of *Villa Louisa*, in Tuxpan, scarcely sustained itself, aided by the constant protection of the Government during many years, we have seen within less than four months after the arrival of the railroad at *Paso del Macho*, a town of three thousand inhabitants arise, without any protection whatever, overcoming the obstacles presented by bad climate, scarcity of water, and opposition on the part of the owner of the ground.

“The advantages to commerce and manufactures are too evident to require further comment.

“Agriculture is the true source of national wealth, and once developed and perfected will be an inexhaustible fountain for Mexico, since her fertile fields and variety of climate, are suitable to the growth of every kind of produce in greater abundance than required by the necessities of the country. At present, production is limited to the demand in the localities nearest the points of cultivation, since transportation over bad roads for great distances must enhance prices, and we frequently see with regret that the supplies of potatoes, flour and even fruit to the coast come from abroad, while in the interior of the country, land owners cultivate only half of their ground or less, since they can find no market for their crops, for which they obtain miserable prices. Evils so great can only be remedied by railroads, which will not only cause the whole country to be well supplied, but will furnish export for the surplus, since the legitimate desire of gain will stimulate farmers to improve their mode of culture, and to employ usefully as much ground as possible in order to increase their profits.

“The most important branch of industry at present is that of mining: nevertheless, it has not received from our government the protection it deserved, perhaps because requiring special knowledge, our public men have not understood the true mode of encouraging it. We will therefore allow ourselves to dwell briefly upon a question of such vital interest.

“Public utility requires the largest possible increase in the production of ores; therefore any measures tending to this end are profitable.

“By examining the influences which militate against mining interests, we shall easily discover the means of counteracting them.

“The yield of mines does not depend alone upon the nature of their veins, but directly upon the charges on the ores and the expenses which must be met in those operations to which the products of the mine must be subjected in order to obtain the pure metal by reduction.

“ Production is limited by the sum of these amounts according, invariably, to an inverse ratio, the greater the expense, the less the product- and *vice-versa*.

“ Of the material brought forth from a mine, only that portion can be reduced, the fineness or yield of which is greater than the sum total of expenses and taxes ; the *poor ores* or those of inferior yield are thrown away as *tailings*. It is evident, therefore that by diminishing the expenses, these waste ores might become available to the advantage of the Treasury and of the public in general.

“ The cost of reduction consists in that of *sal magistral* (sulphate of copper), forage, wood, and other materials generally of little cost and great weight, so that the cost of transportation represents almost their entire value. If therefore, by means of railroads we succeed in diminishing freights, the immediate consequence will be to lower the cost of reduction and increase the yield, since the poor ores, so abundant as to be almost inexhaustible, can then be properly worked.”

Such are the teachings of contemporaneous history—this the route, and these the principles sanctioned by the experience of the most prosperous and advanced nations of the globe.

Peru, following the dictates of this wise policy will reap fruits equally rich and abundant for her children.

VI.

We are neither surprised nor astonished at anything that has been said or written against railroads or against the course pursued by the Government of Peru. Quite as much and perhaps more has been said in countries which, thanks to this eminently enlightening influence are found to-day in the van of progress.

Good roads have always been the test of the civilization and prosperity of a country ; and proof of this assertion will be found in the rank attained by the Chinese, the Romans, and the Indians of Mexico and Peru in ancient times, and by England, Germany, France, Belgium, Holland, Switzerland, and the United States at the present day.

Railroads should be considered as the cause and not the effect of the progress and prosperity of nations.

In order to doubt the abundant fruits, which, at a time not far distant, will be produced by the railroads now being constructed in Peru, one must be entirely ignorant of the inexhaustible sources of wealth enclosed in her immense and privileged territory.

Those who think that the entire wealth of Peru is confined to her guano are incapable of judging the question.

Peru is a synonym of wealth in all modern tongues and the universal fame she enjoys, far from being usurped, has been fully confirmed by the testimony of all scientific men who have devoted themselves to the study of the natural history of this part of the world. Upon this point, the voice of science has confirmed that of national tradition.

In fact all the fruits of the earth are produced in this fertile soil with ease and in abundance. Those which are not indigenous become acclimated with astonishing ease.

Prominent among those soon destined to figure on a grand scale, throwing their influence into the commercial balance of the world, must be mentioned cotton, rice, and sugar.

The sugar-cane grows so rapidly, that in some provinces it ripens six months after planting, and grows moreover, so vigorously and luxuriantly that, from one planting, abundant crops are gathered for many consecutive years.

This crop is largely increasing every year, as shown by the flattering results given by the cane culture, notwithstanding the scarcity of labor and other causes which are of a transitory character. We believe that without exaggeration, and taking as a basis the product of the famous haciendas of Messrs. Delgado, Elguera, Laos, Montero, Swayne, Arbrecht, Canaval, Paz-Soldan, O'Higgins and many others of the Provinces of La Libertad, Chancay, Cañete, Huanuco, Abancay and Caja marca, the annual yield of sugar and spirits in Peru may be approximately estimated at 20,000,000 soles.

These data are sufficient to give a slight idea of the importance which this branch of industry will attain, so soon as the coast lands are irrigated, and the labor question settled, when the planters of Peru will undertake their working on the same scale and under the same system as those of Cuba, Louisiana, Brazil, and India.

As regards rice, wheat, and corn, suffice it to say that they yield two hundred and even three hundred for one, that they produce two crops per year, and that in quality they equal those of Spain or the United States.

Cotton is indigenous, and yields so abundantly and of so superior a quality, that the results obtained since the close of the American war augur a brilliant future, if the planters will bestow upon it the same care and attention as those of the Southern States.

Peru abounds in indigenous textile growths, the application of

which to manufactures will one day, when the settling of the Amazon valley shall introduce them, produce a great commercial revolution.

For the cultivation of the mulberry and the silk worm, Peru is, according to competent judges, unrivalled in the world ; since not only are the eggs and cocoons of superior quality : but three, four, and even five crops a year are produced.

The *Saña*, *Motupe* and *Jaen* tobacco is as good as that of Virginia or Ambalena, and the grapes and wines of *Ica* and of *Moquegua* are of superior quality, some of the wines of generous class comparing favorably with the best of Portugal and Spain.

The distilled spirits made from grapes and known as *Pisco*, *Italia*, *Mosto verde* and others, have no rivals, either in America or Europe.

The olives of *Ilo* and the raisins of *Pica* are as rich and finely flavored as the most famous of Seville and Malaga.

In *Carabaya* and in *Huánuco* coffee is grown of a fragrance delicate as that of Mocha, and the chocolate of *Cuzco* rivals that of Caracas or Guayaquil.

Vanilla, cloves, cinnamon, pepper, all grow spontaneously and abundantly in the Amazon provinces, fully equal to the like products of Ceylon, Borneo, Sumatra and Java.

Cochineal, and indigo, as well as a diversity of dye-woods are produced with like profusion in *Ayacucho*, *Loreto* and *Cuzco*.

In medicinal plants, the soil furnishes without culture the famous Peruvian Bark, cascarilla, copaiba, matico, sarsaparilla, coca, guayacum, anacahuita, ipecacuanha, camphor and an infinity of others known to the Pharmacopœia, without including numerous balsams, herbs, plants, and roots, known and used by the Indians, the virtue and efficacy of which await the *exequatur* of the colleges before inscribing their names in the official list, to serve as lenitives to suffering humanity.

Of resins and woods, the regions of the Amazon contain all that is finest and most valuable in the vegetable world, wax of many colors, rubber, sandarac, gum-lac, and woods, valuable both for building and ornamental purposes.

Of animals, we will only mention as being specialties the birds which produce the *guano*, their Indian name being *guanay*, the *llama*, the *alpaca*, the *vicuña*, and the *guanaco*, the wool of which equals the finest of Persia or of India.

In minerals the wealth of Peru is no less marvellous.

In *Puno*, *Huarez* and *Cajamarca*, coal is found very superior to that of Chile, and equal to that of England.

In *Jaén* and *Cuzco*, iron ore in abundance and of excellent quality is found.

The petroleum of *Tumbes*, in quantity and quality will, before long, become a formidable competitor to the American oil.

In Carabaya were found nuggets of gold of extraordinary size, such as the one sent to Charles V., shaped like a horse's head and weighing over 100 pounds; or the one lost near the Bahamas, while on its way to Philip II, and which was of the shape and size of a man's head.

In *Tarapaca*, and the neighborhood of *Iquique*, *Pisagua*, and *La Noria* are situated the famous and inexhaustible deposits of nitrate of soda and borax, more positive sources of wealth than the guano itself. (9)

At about 3 leagues from the port of Iquique are the renowned silver mines of *Santa Rosa*, *Carmen*, and *Huantajaya*, furnishing ores of 5000 marks to the *cajon* (over 16,000 soles per ton) which are without question, among the richest and most productive in the world.

In these mines there have been occasionally found enormous masses of nearly pure silver, such as for instance those found at the close of the last century in the mine called *Coronel* and in that of *Louzas*, which weighed respectively 800 and 200 lbs each.

The mines of *Pasco*, *Hualgayoc*, *Huancavelica*, *Salcedo*, *Huallanca*, *Putaz*, *Salpo*, and *Recuay*, and scores of others have been famous ever since the Conquest.

In fact, Peru, in the vegetable Kingdom, as well as in the animal and mineral, has been prodigally endowed by the Almighty, and a descriptive essay upon her products and wealth, even were we to

(9) The exportation of nitrate, during the year 1860 was 1,370,248 quintals, and has gone on increasing so rapidly, that in 1870 it reached 2,943,413 quintals and in 1872 4,420,784. It is calculated that the amount exported this year will not be less than 6,500,000 qq.

According to the opinion of competent judges, the saltpetre beds occupy a space of fifty square leagues in the pampa of *Tamarugal*, and the amount contained in them at least 63,000,000 tons; but as fast as it is removed new deposits form, so that practically they may be considered as inexhaustible.

The saltpetre beds of *Iquique*, *Pisagua*, and *Tarapacá* are the most abundant and best known; but the same substance is also known in *Jorín* (near *Tarma*), and in other localities of the Republic.

There is likewise an abundance of borax and of nitrate of potash, and although these products are as yet but scantily worked it is undoubted that, before long, they as well as iodine, a supplementary product of the borax manufacture, will form a new branch of industry, a new source of wealth, hardly inferior to guano or nitrate of soda.

limit ourselves to the most important, would furnish material for a volume, which in character and extent would be foreign to the object of the present publication.

This is not a fanciful or exaggerated picture ; but, on the contrary a hasty and incomplete sketch of the wealth and fertility of Peru : it being borne in mind, likewise, that what we have mentioned in regard to certain localities, is in some degree applicable to every Department of the Republic.

Gold, silver, copper, iron, platinum, nickel, cobalt, coal, mercury, lead, saltpetre, nitrate of soda, borax, iodine, marble, wheat, sugar-cane, cotton, coffee, tobacco, rice, corn, vegetables, and fruits of every class, magnificent woods, in fact numberless valuable productions here abound manifesting the prodigality with which these fruitful regions have been endowed by Nature.

VII.

In view of the preceding facts, why is it, therefore, that these countries have not attained the height of prosperity and progress which should be looked for ?

Those who only know them through the accounts of their earthquakes and revolutions are not fitted to understand their true status, nor duly to appreciate the real and inherent causes of their relative backwardness, as contrasted with other countries, educated and constituted with principles and systems, very different from those which served as bases for the Republics founded upon the ruins of the ancient colonial Empire of Spain.

This backwardness is undeniable, but it is no less true that the honorable and enlightened majority of their sons recognize, deplore and strive against it ; and many of their revolutions have had no other cause nor object than the impatient desire of finding a radical remedy for these very evils and defects for which, with equal severity and injustice they are taunted by foreign writers, ignorant of the political history, and even of the physical geography of Spanish America.

It is certain that the younger Republics do not march on the path of progress with the firm tread of the Colossus of North America. But should this fact be considered either as a fatal and inevitable result of climatic conditions peculiar to South America or to moral and intellectual inferiority of those born there ?

Either assumption is too absurd to be worthy of discussion.

The brilliant pages of contemporaneous history refute them.

In science, law, and diplomacy, their sons have shown abilities entitling their names to be enrolled among the distinguished of the world.

The patriotism, bravery, and talent of those who won their Independence acquire daily greater lustre and fuller recognition at the bar of History.

To be just and equitable to Spanish America it is necessary to know the history of the Conquest and subsequent Colonial period. Otherwise it would be impossible to duly appreciate the advancement of nations so recently ushered into independent existence. But, if the institutions, vices, errors and prejudices that had been deeply rooted by three centuries of the most cruel and pernicious rule be considered; then the changes, reforms and the progress obtained within less than half a century, will appear marvellous in the eyes of any impartial observer, and before the world in general as titles to respect and admiration due these Republics ; worthy, by their efforts and sacrifices, of the post they covet and will surely attain among enlightened nations,

But, since so much has been said and written in regard to their earthquakes, their epidemics, and their revolutions, it is but just to dwell somewhat upon the many objects of grandeur, beauty, use, and profit to be found in the depths of their dense woods, in the sands of their mighty rivers, and in the heart of their majestic mountains.

If, to throw discredit upon them, their frequent political disturbances are cited, why not do them justice, speaking of their schools, newspapers, banks, railroads, telegraphs, and all that is progressive, good and noble, accomplished by these nations during the brief years of their political existence. What nation has relatively done more than these Republics, in parity of conditions ?

Could greater proofs of vitality and energy be expected than Peru has shown during the past eight years ?

During this period, Peru has passed through all the horrors and ravages of civil war, foreign invasion, earthquakes and pestilence ; and yet, notwithstanding all these disasters, and, in spite of the financial crises, foreign as well as domestic. Peru was enabled to repel the invader in the victory of the 2nd of May, 1866, raise sundry loans, and punctually pay all the service of her Internal and Foreign debt, and bring to completion many public works, among which are the Palace of the Exposition, a structure worthy of any

Capital in the world ; the railroads to Arequipa, and from Ilo to Moquegua ; and many other public improvements which want of space prevents our enumerating.

Besides these works already finished and built by Government Capital, are other private enterprises, such as the Pisagua, Noria, Peña, Chancay, Ica, Pasco, Eten, and Pimentel Railroads, the Callao Docks, and many banking and industrial enterprises of the highest importance to commercial and manufacturing progress in Peru.

Moreover, contracts have been made and work begun for account of the Government on the Uchusuma aqueduct, the Arica mole and Custom House, and various railroad lines, four of them trans-andean all of which works will be finished and in operation before 1880.

In view of facts so eloquent and undeniable, why defame and discredit the South American Republics ?

What we have stated hastily and superficially in regard to Peru, is applicable in great degree to Chile, Buenos Ayres, and other sections of Spanish America. We believe it sufficient to refute the unfounded charges made with the object of tarnishing their good name, and injuring their credit abroad.

Nothing would be easier than to prove the exactness of our statements, if we could refer to full official statistics for the purpose. Unfortunately no Statistical Bureau exists in Peru, and it is extremely difficult to obtain positively reliable data. We are happy to learn, however, that the present Administration, awake to the true interests of the country, and aware of the deep importance to its financial prosperity of full and trustworthy periodical statements of the imports and exports, the resources and expenditures of the nation, is now organizing a Bureau of Statistics, to be presided over by a gentleman, already fitted by long experience in Europe to fill ably so delicate a mission.

In the absence of such data we have endeavored to fill this void, grouping, although imperfectly, such facts of salient interest as we could obtain from prior publications, mercantile reports, and other semi-official sources. (10)

(10) The associations and companies, of which a list appears upon the following page, have nearly all been organized during the past ten years, and many others are now being formed to promote mining and agricultural interests. The capital thus invested, backed by the irresistible progressive influence of railroads, will tend powerfully to hasten the solution of those questions of political economy, which so justly absorb the attention of the advocates of Peace and Progress.

ASSOCIATIONS AND COMPANIES ORGANIZED IN PERU WITHIN THE PAST FEW YEARS.			
TITLES.	CAPITAL.		QUOTA.
	NOMINAL	PAID UP	
Guano Consignation Co. in England	S. 2,400,000	S. 2,400,000	None for sale.
— — — Spain.....	2,000,000	2,000,000	7,000 p. back
— — — U. States ..	2,000,000	2,000,000	Premium.
Lima Gas Company	1,500,000	1,500,000	—
Callao — — —	300,000	300,000	None for sale
Chorrillos — — —	150,000	150,000	—
Arequipa — — —	225,000	112,000	In Construc.
South Am. Insurance Co.	2,000,000	200,000	Premium.
Lima — — —	2,000,000	200,000	—
Paternal — — —	150,000	1500,00	—
Peruvian Marine — — —	800,000	750,000	—
National Bank of Peru.....	12,000,000	3,600,000	—
Bank of Peru.....	8,000,000	4,000,000	—
— — — Providence.....	4,000,000	2,000,000	—
— — — Lima.....	5,000,000	2,500,000	—
— — — London Mexico y S. America.	900,000	450,000	—
— — — Mortgage Loans	3,000,000	2,350,000	—
— — — Territorial Mortgage.....	1,000,000	850,000	—
— — — Trujillo.....	2,000,000	1,000,000	Par.
— — — Arequipa.....	1,000,000	500,000	—
— — — Tacna.....	1,000,000	200,000	—
— — — Piura.....	500,000	125,000	—
— — — Guarantee.....	2,000,000	500,000	—
— — — Monte de Piedad.....	160,000	160,000	Premium.
Lima Water Company.....	800,000	800,000	None for sale
Ice Co.....	120,000	120,000	Discount.
Callao Dock Co.....	600,000	600,000	None for sale
Bellavista Warehouse Co.....	120,000	120,000	Premium.
Piura Kerosene Co.....	400,000	400,000	Discount.
Sugar Refining Co.....	160,000	160,000	—
Hualgayoc Mining Co.....	80,000	80,000	None for sale
S. American Pacific Steam Co	5,000,000	2,500,000	Premium.
La Peña Salpetre Co.....	410,000	307,500	None for sale
Rimac — — —	400,000	320,000	None for sale
Barrenechea — — —	1,300,000	950,000	Par.
The builder Co.....	1,000,000	300,000	Discount.
National Telegraphic Co.....	450,000	450,000	—
Sumbay Coal Co.....	2,000,000	20,000	Organizing
Total.....	S. 62,425,000	S. 34,895,000	

70%

VIII.

A portion of the press has endeavored to make the present President of the Republic appear inimical to public works and disposed to violate the solemn contracts made in good faith with a Constitutional Government and by virtue of legal enactment.

In order to give credit to so glaring a blunder, one must be totally ignorant of the antecedents of Mr. Pardo, whose ideas and aspirations may be summed up in two words : *Schools and Roads.*

To encourage Public Schools, and to open ways of communication throughout the Republic, have formed the programme of the present Executive. He has long seen that through their influence the great problem of the future must be solved.

To dispel ignorance, and promote the advancement and well-being

of the people, to open new channels to commerce, agriculture, and manufactures, are the most certain means of preserving peace and assuring National prosperity.

The President is fully aware of the foundations to be laid, upon which to build up the moral, political and material greatness of the country. He has already shown this in promoting primary instruction, the irrigation of the coast lands, and the prolongation of the trans-andean railroads to the banks of the Amazon.

It cannot be presumed that he who has uttered the following opinion in regard to the *Jauja* railroad, of which the *Oroya* is but the coast section, could think otherwise.

“A railroad from the Capital of the Republic to the Department of Junin would be, if carried into effect, the easiest and quickest method, as well as politically speaking, the surest, to colonize the mountain regions of Peru. It would be the best system that could be adopted for that purpose. It would establish as bases of colonization, close and enduring ties, binding the Peru of the Present with the Peru of the Future, ties which instead of weakening, would go on growing still closer, as the new colonies acquired greater strength and prosperity; and it would continue, at the same time, to shape and build them up, not in an artificial or forced manner, as must happen, if under the tutelage of the authorities, but by that easy and natural process, by which trade, unassisted, without effort or sacrifice, confers prosperity upon peoples who have within them the true elements for its development.

“Let Jauja be bought within six hours of Lima, and cart roads be opened from Jauja to the forest—that is to say let the forests be bought within two days of Lima, and can it be doubted that, from this fact alone, a great portion of the floating population (especially the foreign) not only of the coast but from abroad, would repair thither to reap the first fruits of those virgin regions, and to gather the rich and valuable productions, so easy to transport to the Pacific coast and thence to Europe?

“The mountain regions produce cotton, coffee chocolate, sugar-cane, vanilla, wax, Peruvian bark, indigo, dye-woods of all kinds, resins and precious woods: let an outlet be found for these and the problem of the colonization of those regions is solved. Let the Government build the road or favor its construction. *It will do the rest itself.*

“It were well to note that, if the opening up of the mountain regions were accomplished as we understand it, that is to say;

through the Pacific slope, and much more if it were due to a railroad, the exportation of its productions to the coast, would soon make Lima the great commercial centre of exchanges, which would render her the emporium of the Pacific trade.

"The elements of prosperity and wealth contained by our country in its natural condition, so to speak, are so real and of such extent, that in applying to them even in theory the simplest principles of social economy, one is startled at the vastness of the consequences logically drawn therefrom, and fears to be looked upon as visionary and utopian, when their colossal proportions are compared with the petty dimensions of our sordid present."

The course pursued by Mr. Pardo, since his election to the Presidency, is an eloquent proof of the fact that the pen of the illustrious writer did not obey the impulses of his fertile imagination only when it traced the *Studies in relation to the Province of Jauja*; but merely gave the results of his profound convictions, born of careful study and inspired by true patriotism.

When called by the voice of the Nation to the highest office in its gift, one of his first acts was to ask from Congress authorization to co-operate with the moral and material aid of Peru, in the realization of the Inter-Oceanic Canal, the laying of a submarine cable from Paita (the northern terminus of the telegraphic system of Peru) to Panamá, and the completion of the network of railroads begun by the previous administration.

Pessimists, utilitarians, and the enemies of progress have pretended to see in the course of the President new complications for the future, tending to the ruin of the National Treasury.

To these short-sighted economists, the indirect consequences of these great works are invisible. They cannot perceive the utility and necessity of expending the talent, time, and money of the Nation upon works, whose final results cannot be now measured or predicted, since they will, later on, affect the progress not only of the country but of the Continent. (11)

(11) The truth of our assertion is proven by what occurred with the Jauja Railroad, the importance and difficulty of which we have touched upon in speaking of the Oroya road. According to the original project its cost was estimated at 30,000,000 of dollars for a length of 50 leagues, that is at the rate of 200,000 dollars per mile.

The Commission named to present a report upon the project gave as its opinion, with great truth and justice, that the amount of the estimate should be no obstacle to the realization of the work, since the resources of the country were ample to effect it, and considering the incalculable economic as well as political benefits to be derived by the entire nation.

In 1862, Messrs. J. Hombert & Co., of Paris and J. Thomson, S. Bonar & Co. of London, presented a proposal to the Government, the principal bases of which were as follows:

They would form a Company, to reside in London or in Paris, and would bind

But in spite of those, who thus interpret the law of Labor, who ignore the great principles of political economy and the sacred duty of contributing to the advancement and well being of the people, civilization will continue to extend her conquests and her benefits, and Peru will not lose the honor of inscribing her name among the Champions of human progress.

Ideas like these must be diffused and encouraged. Without them the great social and economic revolution cannot be accomplished; in vain may we attempt to obtain that which the country most urgently needs, *Foreign Immigration*: that is to say, free, spontaneous, cosmopolite immigration—of Americans as well as French, English, German, Swiss, Italian, or of any other nation, so long as it is composed of laborious and intelligent men of good dispositions; since we need the competition of all these to attain what through their

themselves to complete the amount called for by the estimates, so soon as two-thirds of the capital was subscribed.

The Government to undertake the preliminary surveys.

A guarantee of 7 $\frac{1}{2}$ upon the cost of each section, beginning at the termination of each one of the sections, the extent of which was not determined: the said payments of guarantee being considered as advances at 4 $\frac{1}{2}$ per annum, to be reimbursed from one half the resulting excess, after payment of the 7 $\frac{1}{2}$ mentioned.

The road to become the property of the State after ninety-nine years, and the exclusive privilege to exist for the same period.

All mines discovered within a zone of one thousand metres on each side of the Railroad, to be the property of the Company.

The Company to have the preference in the construction of all Railroads that may be decreed by the Government of Peru.

The then Government in asking congressional sanction, concluded its report as follows:

"The Government, in use of the powers that may be conferred upon it, will always proceed under the conviction that although the main conditions of the contract subsist, the immense advantages which Peru will obtain, later, from the work, will more than compensate the sacrifices made to carry it out and will render the action of this Congress worthy of public approbation."

Some years afterwards in October 1868, the Government authorized Messrs. Castañeda, Riva-Agüero, Canevaro é hijos, Rodrigo, Denegri, Valdeavellano & Co. and Pardo, to form a Company for the purpose of constructing a Railroad from the coast to the Department of Junin, the following being the principal bases of the concession.

1st. The Company shall be formed with a capital of 6,000,000 of Soles.

2d. The Government will loan to the Company in cash 6,000,000 Soles at an interest of six per annum.

3rd. The Company may issue in Europe bonds at a fixed interest, for 6,000,000 Soles.

4th. The total product of the road shall be applied; 1st. to the payment of interest and redemption of the bonds issued; 2nd. to the interest at nine per cent. upon the capital subscribed in shares, and 3rd. the balance to the payment of interest and sinking-fund of the loan made by the Government.

6th In case the cost of the work should exceed 18,000,000 the excess shall be made up by third parts.

We have recalled these antecedents as well to manifest the injustice of those who accuse the Government of carelessness and prodigality, as to invite attention to the fact that if the Oroya and other roads have been contracted for account of the State, no blame can be attached either to Executive or Congress, since both—either in asking for proposals or in accepting those which have been spontaneously presented, have only shown their firm and common desire to contribute to the general welfare of the country, as proven by the multitude of laws and decrees promulgated with the object of encouraging, all public works tending to the development and progress of National interests.

aid has been attained in the United States. (The immigration into the United States now exceeds one thousand per day.)

Here are lands, products, and wealth enough for all the inhabitants of the globe, and, moreover, the auxiliary of a numerous native population, sober, industrious, and docile, very different in character to that of the fierce and indomitable Modocs, Apaches, or Araucanos, and which, without great effort can be lifted from the traditional apathy in which they now vegetate, in consequence of the avarice and oppression of their pitiless conquerors. (12)

Here, on the banks of the majestic Amazon, in those immense and virgin regions where every treasure of the mineral and vegetable world is grouped, nature offers to man an immense field for the exercise of his activity, vigor, and intelligence.

Soon the whistle of the locomotive will re-echo among its hills, and as the waters gushed from the rock when touched by the Heaven-guided wand of Moses; towns and cities will awake in its path, in valleys and forests, as wild and desert now as, but a few years ago, was the Far West of the United States.

(6) The able report of the official commission appointed by the Government to examine the proposals of Messrs J. Homberg & Co of Paris, and Thompson, Bonar & Co., of London, for the construction of the Jauja Railroad says: (Dec. 12, 1862.)

"To dwell upon the first point we should deem an offence to the experience of your Excellency, since it is a familiar truth that there is no more profitable or sound investment for the products of the guano, than such as would unite the centres of mineral and agricultural productions of the interior and perhaps of the very mountains themselves, with the centres of the coast population, and it should be an equally familiar truth that the sacrifices made in this respect by the State, will be splendidly and certainly recompensed in a not far distant future."

The same commission, composed of Messrs. Barreda, Pardo, Paz-Soldan, Canavaro, and Backus, adds in the same report:

"The commission firmly believes that in one year after the opening of the line, it will not only pay 7 per cent upon the capital invested, but will pass that limit."

PERUVIAN RAILROADS (GOVERNMENT.)

	MILES	SURVEYED BY	COST
Mejia to Arequipa.....	107	Blume and Echegary.	S. 2,000,000
Juliana to Cuzco	230	Thornlike.....	25,000,000
Chimbote to Huaraz and Recuay	172	Malinowski.....	24,000,000
Pacasmayo to San Pedro and Guadalupe	93	Do.	2,100,000
Calasñique to Magdalena	63	Guido de Vignau	3,750,000
Plo to Moquegua	232	Thornlike	5,025,000
Arequipa to Puno	145	Malinowski.....	25,280,000
Callao and Lima to Oroya	85	Siebert.....	21,804,000
Salaverry to Trujillo (and branches)	63	Thomas.....	8,400,000
Paita to Piura	48	Alleon.....	1,945,600
Ica to Pisco	48	Blume.....	1,450,000
Lima to Ancon and Chanay	48	Blume.....	2,600,000
Total.....	1,281		S. 128,354,600

PRIVATE COMPANIES.

	MILES	SURVEYED BY	CAPITAL
Arica to Tacna.....	29	Evans.....	Soles 1,600,000
Lima to Callao.....	83½	Gill.....	" 4,000,000
Lima to Chorrillos.....	9	Sterling.....	" 2,600,000
Eton to Ferriñe (and branches).....	50	Prentice.....	" 1,000,000
Pimentel to Chiclayo (and branches).....	45	Alleon.....	" 12,000,000
Tarapacá lines (and branches, with extension to Pica).....	300	Blume and Williamson.....	" 1,600,000
Malabrigo to Ascope.....	25	Sanner and Bush.....	" 1,300,000
Pasco Mines.....	15	Paz Soldan.....	" 320,000
Lima to Maadalema.....	5	Rey y Basadre.....	" 24,420,000
Total.....	496½		

SUBSIDISED ROADS.

	MILES	SURVEYED BY	CAPITAL
Lima to Plasco.....	145	Backus.....	Soles 9,400,000
Tacna to the Bolivian Frontier.....	108	Guido de Vigneau.....	" 18,000,000
Total.....	253		Soles 27,400,000

The Railroads of Peru,
PRESENT CONDITION OF THE WORKS.

GOVERNMENT ROADS.

	MILES		TO BE FINISHED IN	REMARKS.
	GRADED	TRACK LAID.		
Mejla to Arequipa	107	107	Finished	Rented for 5 years, at 360,000 soles for each of the first two years and 480,000 for each of the 3 following.
Jullaca to Cuzco	101	1875	
Chimbote to Huaraz & Recuay.	52	40	1877	
Pacasmayo to San Pedro and Guadalupe.....	26	26		Now working for Gov- ernment account.
Callisnique to Magdalena...	57	47	1873	
Ilo to Moquegua	63	63	Finished	
Arequipa to Puno	232	197	1875	Section from Lima to S. Bartolomé (39 miles) rented at 5,000 soles per month.
Callao and Lima to Oroya....	109	60	1876	
Salaverry to Trujillo (and branches).....	33	4½	1874	
Paíta to Piura.....	2	1874	Rented for 5 years at S. 80,000 for each of the first two years and 105,000 for each of the three following.
Ica to Pisco	48	48	Finished	
Lima to Ancon and Chancay	43	43	Finished	
TOTAL.....	873	645½		Now working for Gov- ernment account.

PRIVATE COMPANIES.

	MILES		TO BE FINISHED IN.	REMARKS.
	GRADED	TRACK LAID.		
Arica to Tacna.....	39	39	Finished	Running.
Lima to Callao.....	8 $\frac{1}{2}$	8 $\frac{1}{2}$	id	do.
Lima to Chorrillos.....	9	9	id	do.
Eten to Ferreñafe.....	50	50	1873	do. (main line)
Pimentel to Chiclayo.....	5 "	15	1873	
Tarapacá Railroad.....	162	93	1874	do. (partially)
Malabrigo to Ascope.....	1876	Company organizing
Pasco Mines.....	11	8	1874	8 miles open
Lima to Magdalena.....	5	1873	
TOTAL.....	334 $\frac{1}{2}$	222 $\frac{1}{2}$		

SUBSIDISED ROADS.

	MILES.		TO BE FINISHED IN	REMARKS.
	GRADED	TRACK LAID.		
Lima to Pisco.....	1876	Organizing.
Tacna to the Bolivian frontier	1878	do.

GENERAL SUMMARY.				
	LINES	MILES.	COST.	
Government lines.....	11	1281	Soles	128,354,600
Private Companies.....	9	496 $\frac{1}{2}$	"	24,420,000
Subsidised lines.....	2	253	"	27,400,000
TOTALS.....	22	2030 $\frac{1}{2}$	Soles	180,174,600

PRESENT CONDITION OF THE WORKS.				
	GOVERNMENT. LINES.	PRIVATE COMPANIES.	SUBSIDISED LINES.	TOTALS. MILES OF RAILS. MILES OF grading
Miles of track laid.....	645 $\frac{1}{2}$	222 $\frac{1}{2}$		868
Do. graded.....	873	334 $\frac{1}{2}$		1207 $\frac{1}{2}$
Do. unfinished } of track	635 $\frac{1}{2}$	274	253	1162 $\frac{1}{2}$
} of bank	408	162	253	823
TOTALS.....				2030 $\frac{1}{2}$ 2030 $\frac{1}{2}$

NUMBER OF MILES OPENED TO PUBLIC TRAFFIC.		
	MILES.	TOTALS.
GOVERNMENT LINES.		
Mollendo to Arequipa.....	107	
Lima to Chancay.....	43	
Lima to San Bartolomé.....	39 $\frac{1}{4}$	
Ica to Pisco.....	48	
Ilo to Moquegua.....	63	300 $\frac{1}{4}$
PRIVATE COMPANIES.		
Lima to Callao.....	8 $\frac{1}{2}$	
Lima to Chorrillos.....	9	
Arica to Tacna.....	39	
Eten to Ferreñafe.....	50	
Pimentel to Chiclayo.....	15	
Tarapaca Lines.....	75	
Pasco Mines.....	8	204 $\frac{1}{2}$
TOTALS.....		504 $\frac{3}{4}$

IX.

The figures we give below, comprising the revenues derived from Import and Export duties during the five years which have elapsed since the era of railroads dawned upon Peru, are more convincing in their silent eloquence than pages of labored argument.

They show that, since the inauguration of the great chain of Peruvian railroads at the close of 1868, the *yearly increase in revenue has been one million of soles.*

And, in order fully to appreciate the importance of these figures, be it remembered that all railroad material and supplies are *exempt from duty in Peru.*

IMPORT AND EXPORT REVENUE COLLECTED IN THE CUSTOM HOUSES OF PERU DURING THE PAST FIVE YEARS			
YEARS.	IMPORT.	EXPORT.	TOTAL.
1,868	2,904,905 99	55,596 20	2,960,502 19
1,869	3,958,119 88	89,778 52	4,047,898 40
1,870	5,110,476 68	135,341 52	5,245,818 20
1,871	5,678,374 46	155,324 97	5,833,699 43
1,872	6,714,510 50	176,504 17	6,891,014 67
TOTAL.....	24,366,387 51	612,545 38	24,978,932 89

The tabular statements we publish show what has been done in Peru within a very brief time, and what may be done, if the people, understanding their true interests, would adopt a policy of peace and discourage all attempts at revolutionary movements.

All the Government Railroads mentioned in the following tables must, according to contract, be finished and open to public traffic before the beginning of the year 1877 ; but, judging from the energy displayed by the Contractor, in the execution of the main roads already built by him in Peru and elsewhere, we may hope to see them all concluded at an earlier date.

It may be well to state that, in the contracts for railroads built by private enterprise, it has been stipulated that at the expiration of the privilege, (generally 25 years) the company may work the road, but without monopoly (during 50 years in some cases, and 99 in others) after which time they become the property of the State. Where the lines have been constructed, however, with private funds and *without* the aid or guarantee of the Government, they are the absolute and unrestricted property of the builders.

In many of the contracts there is a stipulation that, five years before the time of final delivery, the Government shall have the right to name an agent, who shall see that the road is in thorough repair ; so that, when delivered, it shall be in perfect condition for traffic and in conformity with the terms of the contract. This does not conflict with the general right of inspection and supervision reserved by the Government over all railroads in the country.

As regards the guarantee, it has been stipulated that it shall cease whenever the road produces 7 per cent, clear of expenses during two successive years : and that so soon as the yield exceeds 10 per cent *per annum*, such excess shall be paid to the Government on account of the amounts previously expended by it for guarantee.

It is agreed in nearly all contracts made with the Government, that the cost of the railroads built for its account shall be paid to the contractors in monthly instalments, proportionate to the work executed, either in bonds at par or in cash, as may have been agreed upon ; such payments not to exceed in any case the amount of the work performed and materials purchased. The contractors are required to leave in the hands of the Government a certain proportion of the amount payable to them, as guarantee for the faithful performance of their obligations. This guarantee, in most cases, extends for a term of three years after the conclusion of the works, the contractor being responsible during that time for repairs or defective work.

In nearly all preliminary surveys, and in most of the final locations of Peruvian Railroads, an active part has been taken by Peruvian Engineers, among whom were conspicuous for ability and energy,

Echegaray, Elmore, Tamayo, Paz-Soldan, Delgado, Viñas, Arancibia, Pflücker, Rey y Basadre, Cucalon and others.

We give below general specifications forming the bases of Government railroad contracts; the instances where these conditions have been departed from being few and unimportant.

The same may be said in regard to the piers or wharves. We give details of the one at Chimbote. The differences between these and those of similar structure at the other coast termini are not essential.

GENERAL SPECIFICATIONS.

ROAD BED.

1. Width of road at grade in earth or gravel, as well in cuttings as in embankments, 14 feet.

In solid rock excavations, 12 feet wide, at one foot below grade. In these excavations the material must be always removed to a depth of one foot below grade.

2. The tunnels must be 16 feet wide and 19 high, counting from the crown of the arch to one foot below grade, the material being removed to that depth, as in excavations in solid rock, filling up in either case with sand or gravel to grade. As shelter for the road watchmen, niches shall be excavated at every 300 feet, five feet wide, $3\frac{1}{2}$ deep, and 7 high. The tunnels shall be lined, whenever the nature of the ground shall render it necessary.

3. The slope must be one horizontal to ten vertical, in solid rock cuts. In all other cuts and embankments, it shall be the natural slope, save where protection walls are required.

4. The embankments, where formed of earth or gravel, shall be made 6 per cent higher than their final altitude.

5. Where culverts are required, they are to be made of masonry or brick.

6. The *maximum* grade shall be 3 per cent, in curves of less than 900 feet radius, and 4 per cent in all other cases.

7. The *minimum* radius of curves to be 352 feet.

8. The bridges and viaducts must be of iron superstructure, and the piers and abutments of stone and iron.

9. The road need not be ballasted; but the spaces between the sleepers should be filled up until they are covered. In the railways

regions when the ground does not present good natural conditions, a layer of one foot of ballast must be added, using therefor the most advantageous materials.

10. Where public or private roads intersect the line, the necessary crossings and barriers shall be erected.

11. The road is to be securely enclosed, where it passes through cultivated ground.

12. Retaining walls may be made of dry stone, subject however, as are all the works, to the provisions of the 2nd Article of General Requirements.

SUPERSTRUCTURE.

1. Width of track between the rails, 4 feet 8½ inches.
2. Form of rail, that known as T rail.
3. Weight of rail, 63 pounds to the yard.
4. Suspended joints, with two plates of wrought iron adjusted to the rail and weighing at least 20 pounds per pair, fastened with four screw bolts of $\frac{7}{8}$ inch diameter.
5. Sole plates of 7 inches square and 4 3/8 inches thick, of wrought iron.
6. Switches and points of Bessemer steel.
7. Spikes, American machine-made.
8. Sleepers, 8 feet long, 8 inches wide and 5 thick, of oak, larch, cypress or California redwood.
9. The laying of the track shall be conducted with every precaution rendered necessary by changes of temperature, or curves of the line. All rails shall be bent to exact curvature before being laid on curves.
10. Sleepers shall be laid 2 feet 6 inches from centre to centre, and closer at the joints, as is customary.

ROLLING STOCK.

1. First class coal burning locomotives, with *Bissell's Safety Truck* and every modern improvement, able to draw fifty tons net of freight, up grade; that is to say exclusive of their own weight and that of the cars, at ten miles per hour, over grades of 4 per cent and curves of 352 feet *radius*.

Tank engines, able to draw up grade 100 tons of gross load, at 10 and 20 miles per hour, on grades of 4 per cent and 1½ per cent, combined with corresponding curves as specified.

2. All passenger and freight cars are to be provided with two Bogie trucks of four wheels each, and the former shall be made to seat 60 passengers each.

The passenger cars of 1st and 2nd class to have elevated centres and all the advantages of the most modern improvements.

CARS OF MIXED PATTERN.

3. Open eight-wheeled cars with skeleton sides, to carry at least ten tons of freight.

4. Platform cars, in other respects like the foregoing.

5. Box cars for baggage.

6. Cattle cars.

7. Hand cars.

8. The wheels of all cars must be cast iron chilled wheels.

9. Rope signal lines in all passenger cars.

A telegraph line to run the whole length of the road, furnished with the requisite offices, apparatus and other accessories, in each 1st and 2nd class station.

PIERS.

1. The pier or wharf shall consist of two parts—one solid, which shall form the pierhead, and will serve for the loading and unloading of vessels—the other open (skeleton work) uniting the former with the station on shore.

2. The solid portion shall be 656 feet long and 98 wide. It shall be of the Mitchell system, sheathed with iron plates and the interior filled with stone, gravel or sand. Its extremities shall be pointed.

3. The skeleton portion must likewise be of the Mitchell system, and shall be 984 feet long by 33 feet wide.

4. The mole shall be provided with a derrick capable of lifting ten tons—two to lift five tons each, and three to lift three tons.

5. Moreover there must be two derricks on wheels, to lift one ton each.

6. Two lines of parallel track shall be laid on the pier, with the requisite switches at either end to pass from one track to another.

7. Near the end of the mole, eight iron buoys shall be anchored by means of Mitchell's screw piles.

GENERAL PROVISIONS.

1. All material, whether employed in construction or rolling stock and equipment, are to be of the best quality, and from the best manufactories of Europe and the United States, the Government reserving the right to name agents to inspect them where the purchases are made, before shipment to the port of destination.

2. Plans for bridges, stations and in general every work of art, as well as any modification of the line, must be submitted to the inspecting Engineer of the Government for his examination and final approval.

The inspecting Engineer named by the Government will have the right to exact strict compliance with the contract, and solidity in the work.

The works are to be begun at the time mentioned in the contract, and each line is to be finished and delivered to the Government within the time fixed in the accepted proposal. In case of failure to do so, the amount retained as guarantee by the Government will be forfeited by the contractor ; over and above the fines and other penalties stipulated in the contract.

GOVERNMENT RAILROADS.

MOLLENDO (MEJIA) TO AREQUIPA.

This road is 107 miles in length, connecting the port of Mollendo with the city of Arequipa, second only to Lima in importance among the cities of Peru. By the terms of the original contract, ~~the~~ roadstead of Mejia was made the maritime terminus; but in view of the heavy surf breaking almost constantly on the beach at that point, the terminus was changed to Mollendo, twelve miles to the Northward.

The first sod was turned on the 27th of May, 1868 and on the 24th of December, 1870, the line was finished and thrown open to public traffic.

The difficulties encountered were great; water for all uses was brought on mules from a vast distance, and the almost incredible sum of half a million of Soles was spent for this necessary of life, during the brief period occupied in the construction of the road.

In one section of the road, only $27\frac{1}{2}$ miles long, 2,500,000 cubic metres of material had to be removed; the whole amount, including cuts, fills and embankments, being about 7,000,000 of cubic metres, part of the same being in extremely hard rock.

On the *Cahuintela* section, more than 19,000 barrels of powder were used, and on the whole line 2,750,000 pounds.

Stations occur at frequent intervals, and the line descending the slope of a beautiful valley, enters Arequipa, without traversing a single tunnel and crossing only one bridge, 100 feet long by 62 in height, over the Tingo river.

The time employed in making the trip is eight hours from the coast, the elevation reached being 7,600 feet. The return trip is made in six and a half hours. The track, like that of all the Government roads in Peru, except that of *Chimbote*, is of 4 feet 8½

inches gauge, the *maximum* grade four per cent, *minimum* radius of curves 352 feet, the rails weighing 63 pounds to the yard.

The road was scarcely finished, when the contractor proposed to lease it from the Government. The offer was accepted, and a contract entered into, by the terms of which he pays 360,000 Soles for each of the first two years; and 480,000 Soles for each of the three following, payable quarterly at the Treasury Department in Lima.

By the terms of this contract, Mr. Meiggs is responsible for any deterioration suffered by the road or its accessories caused by carelessness, bad management or accident: the cost of keeping the line, stations, rolling stock, machinery &c., in thorough repair being at his charge, and the Government reserving the right of naming an inspecting engineer to see that these conditions are faithfully fulfilled.

The prolongation of the Arequipa road to Puno and Cuzco will make the change of the coast terminus from Mollendo to the neighboring port of Islay highly desirable. A large increase of traffic must necessarily follow the completion of these lines to the latter port, it being more sheltered, commodious and convenient in many respects.

The Engineers appointed by the Government are now examining two routes from Islay, one along the coast to Mollendo, the other to La Joya, a station 96 miles inland.

The following extract from the report of the original surveyors of the Islay and Arequipa route, Messrs. Blume and Echeagaray, will be read with interest.

ADVANTAGES OF THE ROUTE CHOSEN.

“The configuration of the ground between Arequipa and Islay, permits of no hesitation in the choice of line for the railroad. There can be no election among various routes, since the existing is the only one. Hence the idea of special convenience or favoritism in running the line to this or that intermediate point is groundless, in view of purely mechanical considerations. But by a rare and unsought coincidence the fulfilment of the necessary topographical conditions and of the local requirements unite in the only practicable route. Even had a line been projected, exclusively in view of private interests, it could not have been located very far from that which is demanded by the general good. In fact, while the line is without hills, and forms almost a gradual descent from Arequipa to the sea,

rendering the use of steam almost unnecessary on the downward trips, it will unite all the neighbouring cultivated regions and will tend to diminish the time and cost of carrying passengers and freight; as well those coming from the *Tambo* valley on the South, as the *Vitor* on the North. These two valleys are about five hours distant one from the other, the first, four hours from the port, the second, four hours from Arequipa, including the time necessary to reach the several stations on the railroad. The railroad will facilitate the traffic between Moquegua and Arequipa on the one hand and, on the other, that between Camaná, Signas and Majes and Moquegua. The cost of carriage will diminish in increasing ratio with saving of time. These are advantages desired by and patent to all. But the line located involves, we believe, other advantages quite as important and realizable, within a future not distant. These are the transformation of the neighborhoods of Quishuarani, Moco-ro, Huasamayo and the slopes of Tambo, into mining districts no less important than those of Chile. In Quishuarani and Huasamayo, above all, we have at every step come across veins of copper of so promising an aspect that we could not refrain from securing specimens. Of these we have many containing thirty per cent of copper. It is well known that the Spaniards worked some of these mines for the gold they contained, and in the neighborhood of the future tunnel of the railroad, since avoided by skilful engineering, in the immediate vicinity of the river, are more than eighty abandoned drifts. In Quishuarani there yet remains an old establishment for the working of gold ores, in a perfect state of preservation.

These also exist in Canaura and other localities. In a word, the entire neighborhood, not only of the places mentioned, but of others bordering upon the line, such as Mollebaya and Uchumayo, show clear and distinct evidences of having been the object of active mining industry on the part of the Spaniards. And if we, who had neither time to seek for veins nor inclination to do so, occupied as we were with professional duty and exhausted with fatigue, were astonished by the indications of so much hidden wealth, what might not be expected from the labours of experienced prospectors, even should they confine themselves to the numberless old workings. In stating that there are more than eighty within view, we wish to avoid exaggeration. It will suffice to add that on two occasions, after climbing at risk of life and limb to reach a high table land, whence we hoped to obtain a general view of the ground for purposes of location, we found ourselves, at first without noticing it, in what appeared to us a ruined Indian town: but which, upon exami-

nation, had evidently been a mining settlement, supplied with amalgamating yards, tailings, obstructed shafts and various other indications of mining operations. We soon came across the half obliterated paths used by the miners to descend to the river and elsewhere, in search of food and water, and following one of these we reached the bottom easily. Later, we were informed that, in truth, the spot we had visited had been a mining town, whence in ancient times, according to tradition, great wealth had been derived. It must be borne in mind that in those times gold alone, and not copper, was sought for. But in our opinion, the modern miner should do just the reverse, and extract the gold after running the copper into bars. Even to-day this would be impossible without the railroad on account of the expense of carriage. But with it, we doubt not the neighborhood of Quishuarani will become famous for its mines of copper, gold and silver, and that the mines can be worked to great advantage on account of the proximity and abundance of water and forage. In our opinion, smelting works for copper ores could only be established on the coast, since those we have seen have all been silicates and carbonates, and the sulphates or bronzes necessary for the smelting in reverberatory furnaces must be brought from Chile, where they abound and can be obtained at advantageous rates.

“We have cited the special or local advantages of the projected line in order to demonstrate that it is the most advantageous between Arequipa and the coast. But it should not be supposed that we pretend to here set forth the immense general advantages of the railroad which is going to open to the world the rich trans-andean regions of Southern Peru and Bolivia. Such presumption would be an offence to the nation, since it would pre-suppose it ignorant of its best interests, and it would be useless to explain facts generally recognized.

“On the other hand we believe that the liveliest imagination, proceeding upon the basis of a profound knowledge of the country and of its trade, would fail to predict even faintly the progress of Southern Peru, ten years after the opening of the Islay and Arequipa railroad.”

MEJIA (MOLLEND) TO AREQUIPA

ALTITUDES ABOVE THE SEA LEVEL,

Cachendo.....	Feet	3,240
Posco	"	{ 1,830
		{ 1,920
		{ 2,523
La Joya.....	"	4,160
Uchumayo	"	5,750
Cahuintela	"	{ 2,943
		{ 3,100
Huasamayo.....	"	5,400
Corralones	"	6,200
Mollebaya.....	"	6,400
Congata	"	6,477
Huaico	"	6,700
Tingo Grande.....	"	7,113
Arequipa.....	"	7,042 7549

AREQUIPA AND PUNO RAILROAD.

This road forms an important complement to its predecessor. Leaving Arequipa, the line runs in a North-easterly direction, 232 miles to the city of Puno, through which passes a large portion of the internal trade of Peru and Bolivia. Puno is situated on the borders of the great inland sea, Lake *Titicaca*, ~~13,000~~ feet above the sea level. 12.48

On the 18th of December 1869, the contract for its construction was signed, and by its terms the road must be completed in February 1875. However, so actively have the works been carried on, that the line has been graded the whole distance, ~~232~~ miles, and only 35 miles of track remain to be laid. It is confidently anticipated that the road will be finished early in 1874. This line, like all its trans-andean compeers, involves all sorts of topographical and engineering difficulties. It is a labyrinth of cuts, side cuttings, *developments* and bridges; requiring the use of steep gradients and curves of short radius, the former never exceeding however 4 per cent nor the latter being less than 352 feet. 217

Before it is finished there will have been removed at least 7,800,000 cubic metres of earth clay and gravel, and 1,100,000 metres of rock and granite.

There is but one tunnel on the line, but many bridges, viaducts, and retaining walls.

Leaving Arequipa, the longest bridge on the line (1600 feet) is crossed, spanning the river Chili, followed by the Sumbay bridge, 170 feet above the river and 350 feet long.

The Puno line crosses the Andes at the Crucero at a height of 14,665 feet above the level of the sea. The rails having passed this point already, an interesting problem in engineering science, and an important one for locomotive builders and those who invest in railroad running and construction has been presented.

The fact is that there being in no part of the world railroads so elevated as in Peru, no opportunity had ever been presented of ascertaining whether the diminished pressure of the atmosphere would not affect seriously the working of the locomotives and their power of traction.

But on the Puno road this question has been satisfactorily settled and the American engines have been found, by practical experience, capable of drawing up grade fifty tons *net* of load; that is to say, exclusive of their own weight and that of the cars, at ten miles an hour, over grades of 4p3 combined with curves of 352 feet radius, at heights of nearly 15,000 feet above the level of the sea.

AREQUIPA AND PUNO RAILROAD

HEIGHTS ABOVE THE LEVEL OF THE SEA.

Arequipa	Feet	7,042 7549
Yura	"	9,103 8455
Uyupampa.....	"	9,124
Sumbay	"	13,441 13588
Colca	"	14,528
Crucero.....	"	14,665
Lagunillas	"	13,864
Maravillas.....	"	13,073 13130
Caracota.....	"	12,520
Hatuncolla.....	"	11,986
Taya Taya.....	"	12,708 13860
Puno	"	13,902 12852

JULIACA AND CUZCO RAILROAD.

This road taps that of Puno at the town of Juliaca, 40 miles from Puno and 192 from Arequipa, running in a north-westerly direction

for 212 miles, to the city of Cuzco, the ancient residence of the native monarchs of Peru. The still existing relics of the Inca rule, of their wonderful skill in masonry and architecture and of their evident knowledge of astronomy and mathematics, render this one of the most interesting cities in America to the archæologist and historian.

The contract for this road was signed on the 7th of December, 1871. It was begun in 1872 and will require about two years yet to finish it.

A large amount of masonry is required on this line and some sixty bridges of various sizes. The excavations in earth, clay and gravel amount to 7,500,000 cubic metres and 1,400,000 in rock cutting.

There will be 18 stations of 1st, 2nd and 3rd class, provided with every convenience requisite for the comfort of passengers and security of freight.

One hundred and one miles are already graded and ready for the sleepers and rails, and the work is progressing most satisfactorily.

The rapid progress of the railroads of Peru, the great advantages to be derived from them, and their public importance to every Department of State policy, have induced the Government to further efforts in this direction, and a law of Congress passed on the 30th April 1873 contains the following clause :

“ Interest at 7 per cent *per annum* is guaranteed upon a sum not to exceed sixteen millions of soles, to the Company which shall construct, with its own capital, a railroad from the Cuzco line to a navigable point beyond the confluence of the Tambo and Urubamba rivers, and which shall establish steam navigation in the Ucayali.”

CUZCO RAILROAD.

HEIGHTS ABOVE THE LEVEL OF THE SEA.

Juliaca	Feet	12,946 12600
<u>Ayavire</u>	“	13,752
Pucará	“	12,723
Santa Rosa.....	“	14,095
La Raya (summit)	“	14,172
Sicuani.....	“	11,614
San Pablo.....	“	11,430

Combapata.....	“	11,375
Cumpata.....	“	10,824
Cuzco.....	“	11,375

CHIMBOTE AND HUARAZ RAILROAD.

The general conditions of this road are the same as those of the other trans-andean lines.

The maritime terminus is the port of *Chimbote*, one of the most roomy and safe on the Pacific coast. The inland termini are *Huaraz*, capital of the Department and *Recuay*, the centre of one of the most important and richest mineral districts in the Republic. Its length is 172 miles, with ten stations and seven way platforms.

In the port a magnificent iron landing pier will be built, 1640 feet long, founded on screw piles of the Mitchell system, with railroad tracks running its entire length and communicating with the Station and Custom House. Steam cranes, fixed and portable, will render the shipment and discharge of cargo easy and rapid. Water will be brought in iron pipes from the Santa river, 16 miles distant, and the line be furnished with complete telegraphic service.

Twelve million cubic metres of earth, gravel and rock must be removed in the grading and filling of this road: thirty tunnels, some of them over 2000 feet in length, perforated through solid rock, and 48 bridges constructed—that of Huaylas 558 feet long, that of Caraz, 394.

The contract for this road was concluded on the 6th November, 1871, for the sum of S.24,000,000 cash: 52 miles are graded and 40 miles laid with rails.

CHIMBOTE AND HUARAZ RAILROAD.

HEIGHTS ABOVE THE LEVEL OF THE SEA.

Suchiman	Feet	874
Taquilpon	“	2,283
Yuramarca.....	“	3,857
Huaylas	“	9,140
Caraz	“	7,337
Yungay.....	“	7,641
Carhuaz.....	“	8,679
Huaraz	“	9,920
Recuay	“	11,040

PACASMAYO, SAN PEDRO, AND GUADALUPE RAILROAD
AND CALASNIQUE AND MAGDALENA RAILROAD.

These two roads may be considered as the first and second sections of the railroad to Cajamarca, Capital of the Department of that name.

The first section, or the portion between Pacasmayo and Guadalupe was originally contracted for private account with Mr. Barbe; but after sundry transfers and modifications, the Government resolved to carry it through for account of the State, Mr. Henry Meiggs undertook its construction, as well as that of Calasnique and Magdalena.

The length of the first section is 26 miles, of the second 67—Total 93 miles.

It is estimated that over three millions of cubic yards of material will have to be removed in building this road and 18 bridges erected from 20 to 600 feet in length.

In the port of Pacasmayo an iron landing pier of 2,300 feet long, on the Mitchell system, will be constructed, greatly increasing the facilities and consequently the business of the port.

Eighty tree miles are graded and 73 miles finished. The bridges alone delay the work somewhat, but as all the material is already on the ground, the trains may be expected to run over the whole road early in 1874. The mole will not be finished until some months later.

Two lines of railroad are being built with private capital in the same Department—that of *Eten* and that of *Pimentel*.

Mr. Montero, who has recently made propositions to the Government for the promotion of foreign immigration, in speaking of the same Department traversed by this road, (*La Libertad*) says:

“The provinces of Chiclayo and Lambayeque can cultivate annually 10,000 fanegadas of sugar cane (70,000 acres) with 10,000 European laborers for cultivation and an equal number for carriage and elaboration, producing 6,000,000 quintals of sugar at 6 soles each, or 36,000,000 soles: exclusive of many other agricultural or stock productions, which besides yielding many of the comforts of life, would furnish produce for market, domestic animals, &c. The borders of the plantations, water courses, &c., might be planted with mulberry trees, and the colonists, in their leisure moments, might cultivate the silk-worm, which produces abundantly in Peru, where four crops a year may be obtained. Should we form an agri-

cultural society, to which each estate owner would contribute his contingent of ideas to form solid bases of association, is it not certain that our agriculture would progress? Why should other countries, half-buried in the snows, less rich, obtain such great results? Do they not proceed from study, economy and union?"

ILO AND MOQUEGUA RAILROAD.

This road was contracted for by the house of Devés Frères, in December, 1870, and shortly afterwards the contract was transferred by Government consent to Henry Meiggs.

It is the property of the State, and the cost of construction, according to contract was 6,700,000 Soles in Bonds issued in accordance with the law of January 24th 1871: but by a later arrangement with the contractor, the Government assumed the Bonds, at 75 per cent. agreeing to pay him the equivalent in cash.

The preliminary surveys of the line were made by the Engineer, Alexander Guido de Vignau; but the final location was modified under the approval of the Government Inspecting Engineers.

This road starts from the port of *Ilo*, and passing through *San José*, *Alto del Conde* and *Cataluma* terminantes on the heights above the new town of *Moquegua*, called *Alto de la Villa*, the site selected by the people of *Moquegua* for the new settlement, on the destruction of the old city by the earthquake of August 18th, 1868. The town of *Ilo* was so completely swept away by the tidal wave that accompanied this grand convulsion of Nature, that when the writer called there a few weeks later, the only vestige of former habitations visible was the iron water tank of the Pacific Steam Navigation Company.

The road is 63 miles long, running through one of the richest wine producing districts of the country. It has a handsome mole at *Ilo*, stations, workshops, telegraphs and, in fact, all the appointments of a first class road.

It was finished and delivered to the Government early in the present year, after a rigid inspection by a committee of Government engineers, appointed *ad hoc* by the present administration. Their report is long, minute and conscientious, and they cheerfully certify to the fact that it is solidly, well and carefully built, and conforms in every requisite to the specifications of the contract.

Its administration is confided to one of the most skilful and experienced Engineers in the Government service, and in its first year of service has gained an amount over and above expenses,

small it is true, but giving great promise of usefulness for the future.

CALLAO, LIMA AND OROYA RAILROAD.

The *Oroya Railroad*, as it is generally styled, whether regarded as a work of engineering skill, as a triumph of human energy and perseverance over almost insuperable obstacles, or as a work of political and economic importance, must be considered as one of the most interesting in the world.

It does not enter into the plan of the present publication to describe it. It would be impossible to do so. We propose simply to give such facts in regard to it as may suffice to convey a general idea of its grandeur.

The contract was signed in December, 1869, and provides for its conclusion in six years.

Without taking into consideration switches or sidings, its length from the port of Callao to the terminus at Oroya is only 136 miles. The height attained at the point where the line traverses the summit tunnel, ^{04 1/2} 70 miles from Callao, and ^{31 1/2} 58 miles from Oroya is 15,658 feet. From this point the road descends on the Eastern slope of the Andes to its inland terminus which is ^{8/} 12,178 feet in altitude.

It will be seen that the Oroya is, without doubt, *the highest railroad in the world.*

The work upon it began in January, 1870, and already sixty miles are in running order, and 49 more graded and waiting for the rails and sleepers.

Over sixty tunnels, or an average of one every two miles, pierce the mountains in its path. Among these, the most remarkable is the *Galera* or summit tunnel, nearly 4,000 feet long and as before mentioned, 15,658 feet above the sea-level.

The *Agua de Verrugas* viaduct is unrivalled, being the highest iron railroad bridge yet constructed. It is 576 feet long and 253 feet in height. Its elevation is 5,840 feet above the level of the sea. The style of construction is that known as the *Finktruss* and it was erected under the able supervision of ^{LLB} ~~W. H. Tipton~~, C. E., without the loss of a single life or accident of any kind, a most remarkable and unprecedented feat, when the ponderous nature of the bridge and the dizzy heights at which the work was necessarily performed are considered.

The section of the road between Lima and San Bartolomé, 39 miles, has been open during the past years. It is magnated by the Contractor, who pays to the Government 5,000 S. per month

as rent, he paying all expenses and keeping the road, stations and rolling stock in repair. Within a very brief period the line will be opened to Matucana, 62 miles from Lima. The portion embraced between Callao and Lima can only be used for carrying the material to be employed in the construction of the line; the *Lima Railways Co.* having an exclusive privilege or monopoly, granted in 1852 to the projectors of the road and which prohibits competition between those points. This will expire in 1876, when the Oroya road will share in the very heavy freight and passenger traffic between the chief port and capital of the Republic.

Should no unforeseen cause arise to impede the progress of the works, we may confidently expect that, by the close of the year 1874 the entire system of cuttings, embankments, fills, bridges, viaducts and tunnels, forming the Oroya railroad, will have been completed, and the first great link riveted to the soil that shall multiply into a chain of priceless value to the political and economic future of Peru. The road, to fully develop its usefulness must be extended on the Eastern slope of the Andes, until it reaches the navigable tributaries of the Amazon. Then will the Great Central trans-andean Railroad become *Interoceanic* and not only Peru but the entire Continent will feel the beneficent results of what has been criticised as a chimerical enterprise by those whose ideas of political economy embrace only the amount invested and ignore the immense benefits, direct and indirect, that always have flowed and must flow from the establishment of railroad communication.

Callao Lima and Oroya Railroad.

DISTANCE FROM CALLAO IN MILES	STATIONS	ELEVATION IN FEET
0	Callao.....	0
7 $\frac{1}{2}$	Lima	448
18 $\frac{1}{2}$	Santa Clara	1312
33 $\frac{1}{2}$	Chosica	2800
44 $\frac{3}{4}$	Cocachaera	4588
46 $\frac{3}{4}$	San Bartolomé.....	4905
51 $\frac{3}{4}$	Viaducto Agua de Verrugas ..	5840
55 $\frac{3}{4}$	Surco	6655
62 $\frac{1}{4}$	Matucana	7788
69	Tambo de Viso.....	8870
74 $\frac{1}{4}$	Tamboraque.....	9843
77 $\frac{1}{2}$	San Mateo'	10530
79 $\frac{3}{4}$	Puente del Infiernillo.....	10923
81 $\frac{7}{8}$	Puente de Ancón	11300
83	Rio Blanco.....	11543
86	Chilca.....	12220

SALAVERRY AND TRUJILLO RAILROAD.

This railroad is being constructed for Government account. The terms of the contract are more or less same as those of the other Government roads.

The maritime terminus is the port of *Salaverry*, where a sea wall and landing pier must be constructed. Passing through *Moche*, it terminates at *Trujillo*, capital of the Department of *Libertad*, a rich and populous State. Sundry short branch lines will be built from *Trujillo* to *Pedregal*, *Chocope*, *Paijan* and *Ascope*.

The entire line is 85 miles long and offers no features of great difficulty in construction or location. Four and a half miles are already finished, and 33 are graded and ready for the superstructure. By the terms of the contract, the line should have been delivered to the Government in October of this year. Unforeseen difficulties have retarded its completion and it is probable that another year will be required to finish it.

PAYTA AND PIURA RAILROAD.

The building of this road was contracted in July 1872 with Mr. Frederick Blume, C. E. It runs from Payta, a port 450 miles North of Callao, to the city of Piura, capital of the Department, passing through Huaca and Sayana, towns situated on the left bank of the Chara river, a stream navigable beyond Sayana for small steamers drawing four feet of water.

The line is 63 miles long, of which only two are graded.

An iron pier is to be built in Paita, 328 feet long, on the Mitchell screw pile system.

The works have been partially suspended, owing to pressure in financial matters: but will shortly be resumed.

Mr. Paz Soldan in his Geography, writing of this section of the country, gives the following interesting facts regarding its trade.

“The soil of Piura possesses naturally, as we before said, rich and abundant fruits, which are well cultivated by the inhabitants; obtaining thus not only enough for home consumption but a surplus for domestic and foreign export.

“The principal productions are leather, soap, salt, cotton, wax, petroleum (extremely abundant near Tumbes) live stock, especially mules, and fine straw hats, called *catahuas*, after the place of their

manufacture. These are shipped, either by steamer or in small native boats, to the neighbouring ports and to Guayaquil; the return cargo consisting of fruits, weaving warps, chocolate, cigars, &c.

“The ports through which this trade passes are Paita, port of entry, Tumbes, minor port, and Sechura, port where only domestic export and now dutiable imports are allowed.

“The Department is one of the most commercial in Peru and will take the front rank in exportation, especially of cotton. Nature appears designedly to have endowed the province with this valuable and necessary plant. All the soil, and particularly that near the coast, may be profitably cultivated. Frost, the enemy of the cotton plant, is unknown. An American engineer, Mr. Alfred Duval, who has made cotton growing a special study in various parts of the world, and during six years in the province of Piura, says that he knows of no healthier climate and of none so well fitted for the production of cotton. The temperature never rises above 88° Fahrenheit. Cotton is indigenous, and will grow with little care, without any special cultivation. From 1852 to 1858, 15,000 quintals were exported, without taking into account the large quantity consumed in the province in yarns and textile fabrics for clothing the Indians.

According to the opinion of experienced growers, one cotton plant, after the second or third year, will give five or six pounds per crop, and 5,000 square *varas* (the *vara* is 33 inches) will produce from 1,000 to 1,200 pounds. A *topo* of ground is about equal to the English acre and a volume of water equal to 450 cubic feet every twenty-four hours is sufficient to supply a *topo*. The plant requires less water as it attains maturity.

In view of these facts, and desiring to encourage the development of agricultural and mining industry in that section, Congress has authorized the Executive to cause preliminary surveys to be made for the prolongation of the line to a point on the Amazon river called Limon, passing through the provinces of Huancabamba and Jaen, a route supposed by those who have been on the ground to be the shortest yet projected in South America between the Atlantic and Pacific.

PISCO AND ICA RAILROAD.

This road was built by a private Company; but the Government perceiving the disadvantages of having it in private hands, purchas-

ed it, paying back 450,000 Soles, the amount already expended by the Company and assuming all its obligations. The Company by original concession was authorized to issue bonds for 1,450,000 soles, upon which the Government guaranteed seven per cent. interest during 25 years, granting a monopoly for the same period.

The road has been leased for five years and the lessee pays 80,000 Soles for each of the first two years and 105,000 during each of the following three years.

It is 48 miles long, and runs from the port of Pisco through the rich province of which Ica, the inland terminus, is the Capital.

It was proposed to prolong the line to Ayacucho; but the preliminary survey discovered topographical difficulties of such magnitude, that it will probably not be carried out.

LIMA, ANCON AND CHANCAY RAILROAD.

This Railroad forms the 1st and 2nd sections of the Lima and Huacho road and, starting from the right bank of the Rimac river which flows through the centre of the city of Lima, pursues a northerly course nearly parallel with the coast, with stations at Infanta, Puente Piedra, Ancon and Pasamayo.

It was built by a Stock Company with a Capital of 3,000,000 of Soles, in shares of 500 and 100 Soles, fully paid up. The Government guaranteed seven per cent. interest upon a sum not to exceed 1,300,000 soles. Afterwards this concession was annulled, the Government taking shares to the same amount (1,300,000) and considering an amount of £25,000 previously advanced to the Company as equivalent for the same.

But finding that none of these efforts to redeem the financial difficulties of the Company were successful, the Government resolved to assume entire control of it, in protection of its own investments, and purchased the whole number of shares giving to the shareholders in Exchange for their certificates of stock, bonds bearing five and six per cent. interest with quarterly drawings of 8,000 Soles. The five per cent. bonds were given to the original stockholders and the six per cent. to the later purchasers.

Market reports give the following data in regard to these securities outstanding:

LIMA AND HUACHO RAILROAD BONDS.

January 1st, 1873, 5 per cent.....	Soles	343,100.00
— — — 6 per cent.....	„	813,059.00
		<hr/>
	S.	1,156,159.00
January 27, 1873 redeemed at 68 to 72 p.⊗ ...	S.	29,277.77
		<hr/>
Outstanding June 10th.....	S.	1,132,881.28

LIMA AND CHANCAY RAILROAD.

The following is the official report of the Superintendent of the road for the quarter ending June 30th, 1873, showing a marked increase in receipts over the same quarter of the preceeding year:

1872		1873	
April	S. 10,936.33	April.....	S. 15,314.66
May.....	„ 9,779.38	May.....	„ 12,057.88
June.....	„ 10,436.48	June.....	„ 10,777.89
	<hr/>		<hr/>
	S. 31,152.19		S. 38,150.43

The road has been under Government management but has recently been leased by means of sealed proposals, under sundry bases, one of which stipulates that the road is to be prolonged to Huacho.

Should this be done and a junction made with the Oroya line, running parallel with it on the left bank of the Rimac, the business of the road will be vastly increased.

PRIVATE RAILROAD COMPANIES.

ARICA AND TACNA RAILROAD.

The building of this road was undertaken by Mr. Joseph Hegan in August 1852 and it was opened for business, January 1st, 1857.

The capital stock of the Company was fixed at 2,000,000 of dollars (S. 1,600,000) and the Government of Peru guaranteed 6 % interest upon the same during 25 years,—the guarantee to cease so soon as the road should earn sufficient to pay an equal sum. An exclusive privilege or monopoly was also granted the road during ninety-nine years.

In 1853 Mr. Hegan, until then sole contractor, transferred his interest to an English Company, with the style and title of Arica and Tacna Railway Company. The road begins at the port of Arica, the great *entrepôt* of northern Bolivia, and runs inland on a light gradient, 39 miles to Tacna, Capital of the Department, and commercially next in importance to Lima. To fully comprehend the importance of this road, it should be borne in mind that by virtue of treaties between Bolivia and Peru, the custom House at Arica has been common to both Republics for many years past, the latter paying to Bolivia an annual subvencion of half a million of dollars, and receiving in return duties upon all merchandize imported through the port of Arica, for consumption in Bolivia, the latter Republic having no other port of entry (save Cobija, one of minor importance) until the comparatively recent discoveries of rich silver lodes at *Caracoles*, and of guano at Mejillones rendered necessary the opening of Mejillones and Antofogasta.

The great earthquake of Aug. 13th. 1868, destroyed several miles of the track, the pier, station and other works of the Company at Arica, and a large amount of rolling stock was swallowed up and hurled into the sea by the great tidal wave, forty feet in height, which dashed upon the town. The Company promptly repaired the damage, and is now one of the most prosperous in South America. The Government guarantee has long since ceased, and satisfactory dividends are declared semi-annually in London.

CALLAO AND LIMA RAILROAD.

LIMA AND CHORRILLOS RAILROAD.

These two roads are now consolidated under the management of an English Company—the “Lima Railways Co.”

The first runs from Callao, the principal seaport, to Lima, the Capital of the Republic, and is, in comparison with its cost, one of the most remunerative in the world.

It was built by Don Pedro Candamo and Messrs. Oyague Bros. The concession bears date Dec. 4, 1848, and it is consequently the oldest line in South America.

The line is $8\frac{1}{2}$ miles long, and 9 trains a day run between the two cities, conveying passengers, freight trains being run at intermediate hours. The trip is made in 30 minutes; fares 40 cts. for 1st class, and 20 cts. for 2nd class. The exclusive privilege of the road will expire in 1876.

The Lima and Chorrillos Railroad contracted for by Barreda & Brother in 1856, connects the capital with the famous watering-place of *Chorrillos*, 9 miles distant and situated upon the bluffs overlooking the sea. During “the season,” seven daily trains run between the termini, and the afflux of passengers is enormous. The road has an exclusive privilege for 20 years which will expire in 1878.

The original cost of the two roads was S. 1,200,000. They were purchased by the Company now owning them, and the capital stock increased to S. 4,000,000, upon which an annual dividend of 12 to 13% is earned.

ETEN AND FERRAÑAFE RAILROAD.

The original concession was made on the 3rd of July 1867, to José A. Garcia y Garcia, who transferred it, by permission of the Government to a Stock Company, on the 19th October of the same year.

The line is 50 miles in length, and was completed but a few months since. It begins at the port of Eten, where a handsome iron pier has been erected, and terminates at Ferrañafe, passing through the towns of *Eten*, *Monsefu*, *Chiclayo* and *Lambayeque*. A branch line will run from *Chiclayo*, communicating with the princi-

pal estates in the valley, such as *Suman*, *Pomalca*, *Pucará*, *Calupe*, *Combo*, *Tuman* and *Patapo*.

The amount invested in the enterprise is S.2,600,000. No interest has been guaranteed by the Government, although Congress was asked by the company to grant such guarantee; but it possesses a monopoly for 25 years, and the results given by that portion of the line already open to traffic are such as to justify the belief that it will soon pay satisfactory dividends. New branches are even now projected to the valley of *Zaña* and to *Chongallape*, the bases of supply and export of *Chota* and *Jaen*.

The latest semi-annual reports speak as follows of this enterprise:—

Eten and Ferrañafe.—Capital 2,000,000 soles in 2000 shares of S.1000 each. The Bonds, S.600,000 bear 9% interest, payable semi-annually and a sinking fund of 5% by drawings at the close of each year. Last quotations of the 8% Bonds, 85%. The works on the branch lines and the mole are on the road to completion, when the line will be in full working order. The Company paid on the 31st December, 1872, the semi-annual interest and the 30 Bonds of 1000 each drawn on the 2nd of July 1872, and according to the 2nd clause of the contract, the drawing of the 30 Bonds payable on the 31st of December of the present year took place on the 1st of July.

PIMENTEL RAILROAD.

This railroad is being constructed with private funds, the government being called upon for no further assistance than an exclusive privilege for 25 years and the right to construct the necessary branches.

It leaves the coast at the port of Pimentel and terminates in *Chiclayo*, with branches to *Lambayeque*, *Muchumi*, *Túcuma*, *Picsi* and *Ferrañafe*, in all 45 miles.

More than one-third of the road is already finished, and the rest is being pushed forward with great rapidity, the whole of the grading being finished, so that but a few months more will be required to put the line in running order.

The Capital Stock of the Company is S. 1,000,000.

TARAPACA RAILROADS.

We have included in this title all the lines of railroad now being built in the province of Tarapacá by Messrs. Montero Brothers, not only because they are the property of a single firm, but because we have been informed that it is their intention to extend them to the town of *Pica*, thus forming a network of railroads embracing all those now in construction.

The object sought is to bring all the Nitrate of Soda establishments of the Department in contact, by means of railroads which leave the coast at *Patillos*, *Pisagua* and *Iquique*, passing in their course through the saltpetre works of *La Noria*, *Cocina*, *Altagracia*, *Yungay*, *Negreros*, *Lagunas*, *Pampa Negra*, *Chinquiquiray*, *Sal de Obispo*, *Zapiga*, *La Peña* and others.

The idea of running the line as far as *Pica* is founded upon its probable prolongation to the interior of Bolivia, Messrs. Montero Bros. having already entered into contract with the Government of that Republic.

The saltpetre railroads, if we may so style them, which are the *Patillos*, the *Pisagua*, and those from *Iquique* to *La Noria* and *La Peña*, when finished and connected, one with another, will be 180 miles in length, and the *Pica* branch will be 120 miles further.

Of these roads, 98 miles are already furnished with the rails, 162 miles graded and the remaining 18 miles are being actively pushed forward, so that within a year, the entire system can be completed and open to traffic.

This Company has an exclusive monopoly for 25 years as well as other privileges and exemptions, making the enterprise one of the most promising in South America in view of the exceptional nature of its traffic. The carrying of the Nitrate to the coast offers an unfailing and enormous freight, *on a down grade*, the rolling stock of the part of the road already constructed being utterly insufficient to supply the great and increasing demand for carriage. We have mentioned 12,000,000 of soles as the capital required to build and equip these roads (exclusive of the *Pica* branch) but are unable to give the exact amount, the enterprise being a private one.

In one of the newspapers of Lima, of recent date, we find the following paragraphs in the letter of the *Iquique* correspondent:

“Within the past few days the weather has greatly changed and the fogs cling tenaciously to the coast hills. This circumstance

hinders the transport of nitrate by the railroad and affects its general traffic. *Notwithstanding this the quantity transported daily by the company, even under the disadvantages mentioned, is more than double that estimated as the probable production of the entire province when the road was first projected.*

“It is necessary therefore to show more indulgence to the Company, than those who are so anxious to decry it, are willing to allow.

“The telegraphic line is being finished and other improvements no less important, are being made of which as often happens in the case of private enterprises, the public is ignorant.

“The works are of great magnitude and of the highest importance to the Province.”

MALABRIGO AND ASCOPE RAILROAD.

This line, as projected, will be 25 miles in length, from the port of *Malabrigo* to *Ascope*, passing through *Paijan* and *Chocope*, and near the towns and plantations of *Chicama*, *Santiago de Cuo* and *Magdalena de Cao*.

The Company has taken, as bases for calculating the yield of the road the population of the towns above mentioned, amounting to 17,000, and the production of the estates in the valley of *Chicama*, which it classifies as follows :

<i>Sugar</i>	1,385 fanegadas (9,245 acres)	
	planted with cane, minimum	
	production	Qtls. 801,000
<i>Rice</i>	750 fanegadas (5250 acres)	
	planted with rice, average	
	yield of clean grain, “	60,000
<i>Anisecd. Barley, Alcohol, &c</i>		“ 100,000
		<hr/>
		Qtls. 961,000

It has been calculated, moreover, that by the close of last year there had been planted 2,500 fanegadas, (17,500 acres) of cane, which would give an annual yield of 1,500,000 quintals of sugar. It is natural to suppose that this gradual increase in production will continue, since the diminished cost of transportation brought about by the completion of this and the Salaverry line, will encourage the use of machinery and implements heretofore unknown or unused, owing to the difficulty and cost of placing them on the ground.

The original contract was given to Mr. José Gregorio Garcia, Aug. 26th, 1869, and contained the usual clauses of exclusive privilege for 25 years, exemption from taxation, right of way, free entry of material, &c. It was transferred to a Stock Company on the 2nd May, 1871.

The Capital Stock is 1,600,000 soles. 1,000,000 of it in 100 shares of S. 10,000 each and 60 industrial shares of like value, only to be used in case of necessity, and by vote of the active shareholders.

The residents on either side of the line, recognizing its importance to their interests, have generally granted the land necessary for the line, free of cost, and the Government has also ceded, *gratis*, 120,000 square varas of ground at the port of Malabrigo, for the station, buildings, shops, &c.

Eight steamers a month, from Callao, touch both going to and returning from the more northern ports ; the Guayaquil steamer once a month each way, besides many sailing vessels.

CERRO DE PASCO RAILROAD.

On the 26th of Sept. 1867, the contract for this road was given to Henry O. Wyman & Co. The original estimate was for S. 1,300,000, the Government guaranteeing 75 interest upon this sum, and giving an exclusive privilege for twenty-five years to the Company.

It is 15 miles in length and its special object is the carriage of goods and passengers between the mining city and the surrounding estates.

The works were begun in June 1869; but there are now 8 miles open and three more graded.

The slow progress made in the building of this line, is partly attributable to financial obstacles and partly to the great difficulty experienced by the contractors in conveying materials to so inaccessible a region, 200 miles inland, 14,275 feet above the level of the sea, and reached only by wretched mule roads.

The *Mercantile Review*, in a late issue, gives the following report of the condition of the enterprise :

CERRO DE PASCO RAILROAD.

80	Bonds with 40	sinking fund.....	S. 100,000	no sales
60	Government Bonds 40	sinking fund, guaranteed by mortgage of the line.....	“ 400,000 last sales	85%
70	Bonds, semi-annual drawing			
	9,229 soles at par.....	“ 615,000	“ 66%	

But a proper estimate of the true value or importance of this railroad, cannot be formed from these data. The local traffic alone will afford satisfactory dividends, so soon as the line is completed, and should the contemplated connection with the Oroya line be made, its business will be vastly increased, with the great impetus given to the mining interest by increased carrying facilities, enabling ores, now thrown aside as worthless, to be profitably exported, and by the facilities for importing the most improved mining machinery.

The amount of silver ore at present mined at Cerro de Pasco does not exceed 110,000 tons per year. This production will be greatly augmented under the favorable conditions mentioned.

LIMA AND MAGDALENA RAILROAD.

This road, the shortest in Peru, is a narrow gauge line from the city of Lima to the watering place of Magdalena, five miles west of the capital on the sea coast. It is being constructed by a company, with a capital of S. 320,000 in shares of S. 1000 each.

The line is all graded and the superstructure and rolling stock are expected very shortly to arrive in Lima. The works at Magdalena are rapidly progressing and real Estate in the neighborhood of the line is rapidly rising in value, in anticipation of the afflux of passengers from the Capital during the oppressive heats of summer. So soon as the monopoly now held by the Lima and Callao line shall expire (in 1876) it is the intention of the Company to prolong its own track to the port of Callao and the brilliant success of the Chorillos railroad augurs a like future for this.

RAILROADS OF JOINT OWNERSHIP.

PISCO AND LIMA RAILROAD.

This road will skirt the Pacific coast southward from Lima bringing in contact the valleys of Surco, Lurin, Chilca, Mala, Asia Cañete and Chinchu, with stations at the more important towns, and estates, such as *Surco, Lurin, Chilca, Mala, Cerro Azul, Tambo de Mora, Chinchu Alta, Villa, Bujama, Santa Barbara, Cañete, Hervay Baja, Hervay Alta*. The line will be 145 miles long and tap the richest sugar and wine producing region of Peru.

The original concession was made to Mr. Andres Alvarez Calderoni under date of July 12th, 1869, and by him was transferred to Messrs. Manuel José and Juan Martin Ramos, who have organized a company for the purpose of building the road. The estimated cost is S. 9,400,000. The Government has agreed to loan the Company S. 2,600,000 in special Bonds and has further authorized the issue of S. 2,600,000 in Bonds of the Company, guaranteed by the Government. The company itself is required to furnish a cash capital of equal amount, and to offer to the public, shares in the enterprise equal to S. 1,600,000. The stock will then be represented as follows :

From Government Bonds.....	S. 2,600,000
“ Company “	“ 2,600,000
“ Cash Capital	“ 2,600,000
“ Public Subscription.....	“ 1,600,000
	<hr/>
	S. 9,400,000

RAILROAD FROM TACNA TO THE BOLIVIAN FRONTIER.

The construction of this road was contracted for with Hainsworth & Co. of Tacna and E. Erlanger & Co. of Paris.

No guarantee is given by the Government; but the line enjoys the franchises and exemptions from taxes, duties, &c. usually granted.

A company has been organized in England with a capital of £3,600,000 or S. 18,000,000, divided into shares of £100. Five per

cent is payable on subscription, and the rest in quotas of 5 S as required. The Government has subscribed for £1,200,000 or S. 6,000,000 and 8,000 shares of £100 or S. 500 each have been offered to the public.

The necessity for this road is evident from the fact that all the merchandize entering the port of Arica for consumption in the northern part of Bolivia, passes through Tacna, where it is despatched by mule or llama train to La Paz, the capital of the latter Republic; the cost being from 4 to 5 cents per pound for a distance not exceeding 250 miles. The rich silver, copper, lead, and cobalt ores, the so-called Peruvian Bark, unrivalled alabaster, and other products of Bolivia will furnish remunerative return freights.

A new Custom House and a landing pier are now being built in Arica, to replace those destroyed by earthquake of 1868.

By the completion of this road, and of that which she will build to meet it at the frontier, Bolivia will at length be released from her long isolation from contact with the commercial world.







